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Walters-MacPhee, Lenora

From: Guy R. Martin <[redacted]
Sent: Thursday, May 25, 2017 12:30 PM
To: FPP.MAR / PPP.MAR (DFO/MPO)
Cc: Smith, Colleen A; Fraser, Terri (terri.fraser@northernpulp.com); Cloutier, Kathy (Kathy.Cloutier@northernpulp.com); Gary.S.Porter@novascotia.ca; McLean, Mark G
Subject: Request for review with DFO - Northern Pulp Nova Scotia Effluent Replacement Project
Attachments: Request-for-Review-eng(11 1112A NPNS ETP replacement).pdf; 11 1112A - Process Description ETP.PDF; 11 1112A - Process layout.pdf; drt_rpt_KSH_pre_receiving_water_study(engineering).pdf; 11 1112A - Details of Project Area.pdf

Good morning,

Attached is a duly filled Request for Review form, along with supporting documents, related to Northern Pulp Nova Scotia's Effluent treatment Plant Replacement Project. We understand that this review of the project by DFO will inform us of the steps/activities that will be required in order to be granted approval to proceed with the construction of a new marine outfall as part of the overall project.

Please let me know if you have any questions or require further information.

Best regards,

Guy Martin, ing.

.....
Guy R. Martin, ing
Conseiller Principal, Procédés et Environnement /
Principal Consultant, Process and Environment

KSH Consulting
1 Place Alexis Nihon
3400 de Maisonneuve O., bureau 1500
Montréal (Québec) Canada H3Z 3B8
T [redacted] **M** [redacted] **F** 514.939.5266

KSH

www.ksh.ca

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Fisheries and Oceans Canada | Pêches et Océans Canada

Canada

Request for Review

A) Contact information

Name of Business/Company:

Northern Pulp Nova Scotia Corporation

Name of Proponent:

Terri Fraser, P.Eng.
Technical Manager

Mailing address:

P.O. Box 549, Station Main

City/Town:

New Glasgow

Province/Territory:

Nova Scotia

Postal Code:

B2H 5E8

Tel. No. :

(902) 752.8461 ext. [redacted]

Fax No.:

Email:

terri.fraser@northernpulp.com

Select additional contact:
Contractor/Agency/Consultant *(if applicable)*:

Guy R. Martin, ing.
Principal Consultant, Process & Environment
KSH Solutions, inc.

Mailing address:

3400, de Maisonneuve Boulevard West
Suite 1500

City/Town:

Montreal

Province/Territory:

Quebec

Postal Code:

H3Z 3B8

Tel. No. :

([redacted]

Fax No.:

514.939.5266

Email:

[redacted]

Is the Proponent the main/primary contact? (•) Yes ( ) No

If no, please enter information for the primary contact or any additional contact.

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B) Description of Project

If your project has a title, please provide it.

Effluent treatment plant replacement, including the construction of a new, submerged marine outfall

Is the project in response to an emergency circumstance*? ○ Yes ◉ No

Does your project involve work in water? ◉ Yes ○ No

If yes, is the work below the High Water Mark*? ○ Yes ◉ No

What are you planning to do? Briefly describe all project components you are proposing in or near water.

A new effluent treatment system will replace the existing one located in Boat Harbour NS. This includes the construction of a new marine outfall, which will discharge the treated effluent ~ 9kms from the mill, through Pictou Harbour and into Northumberland Strait

How are you planning to do it? Briefly describe the construction materials, methods and equipment that you plan to use.

HDPE pipe, held down by concrete counterweights and protected from ice scour and other hazards by rocks and other structures. More details provided in 11 1112A-Process description ETP.pdf and drt_rpt_KSH_pre_receiving_water_study(engineering).pdf (attached)

Include a site plan (figure/drawing) showing all project components in and near water.

Are details attached? ◉ Yes ○ No

Identify which work categories apply to your project.

- ☐ Aquaculture Operations
- ☐ Aquatic Vegetation Removal
- ☐ Beaches
- ☐ Berms
- ☐ Blasting / Explosives
- ☐ Boat Houses
- ☐ Boat Launches / Ramps
- ☐ Breakwaters
- ☐ Bridges
- ☐ Cable Crossings
- ☐ Causeways
- ☐ Culverts
- ☐ Dams
- ☐ Dewatering / Pumping
- ☐ Docks
- ☒ Dredging / Excavation
- ☐ Dykes
- ☐ Fishways / Ladders
- ☐ Flow Modification (hydro)
- ☐ Groundwater Extraction
- ☐ Groynes
- ☐ Habitat Restoration
- ☐ Ice Bridges
- ☐ Log Handling / Dumps
- ☐ Log Removal
- ☐ Moorings
- ☐ Open Water Disposal
- ☐ Piers
- ☐ Riparian Vegetation Removal
- ☐ Seismic Work
- ☐ Shoreline Protection
- ☐ Stormwater Management Facilities
- ☐ Surface Water Taking
- ☐ Tailings Impoundment Areas
- ☐ Temporary Structures
- ☐ Turbines
- ☐ Water Control Structures
- ☐ Water Intakes / Fish Screens
- ☒ Water Outfalls
- ☐ Watercourse Realignment
- ☐ Weirs
- ☐ Wharves
- ☐ Wind Power Structures

☐ Other Please Specify

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Was your project submitted for review to another federal or provincial department or agency? (•) Yes ( ) No

If yes, indicate to whom and associated file number(s).

NSE: Helen MacPhail (Helen.MacPhail@novascotia.ca)
CEAA: Nicole Scotney (nicole.scotney@ceaa-acee.gc.ca)

C) Location of the Project

Coordinates of the proposed project Latitude 45.6522° N Longitude 62.7145° W

OR UTM zone ; Easting

Northing

Include a map clearly indicating the location of the project as well as surrounding features.

Name of Nearest Community (City, Town, Village): Abercrombie

Municipality, District, Township, County, Province: New Glasgow, Pictou County, Nova Scotia

Name of watershed (if applicable): Northumberland Strait

Name of watercourse(s) or waterbody(ies) near the proposed project: Pictou Harbour, Boat Harbour

Provide detailed directions to access the project site:

From Halifax:
Take NS-102 and Trans-Canada Hwy/NS-104 E
Take exit 2 from Trans-Canada Hwy/NS-106 N
Continue on Granton Rd Rd/Sunrise Trail.
Drive to Granton Abercrombie Branch Rd

D) Description of the Aquatic Environment

Identify the predominant type of aquatic habitat where the project will take place.

( ) Estuary (Estuarine)
( ) Lake (Lacustrine)
( ) On the bank/shore at the interface between land and water (Riparian)
( ) River or stream (Riverine)
(•) Salt water (Marine)
( ) Wetlands (Palustrine)

Provide a detailed description of biological and physical characteristics of the proposed project site.

Please see attached file 11 1112A - Details of Project Area.pdf for details

Include representative photos of affected area (including upstream and downstream area) and clearly identify the location of the project.

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E) Potential Effects of the Proposed Project

Have you reviewed the Pathways of Effects (PoE) diagrams (http://www.dfo-mpo.gc.ca/pnw-ppe/pathways-sequences/index-eng.html) that describe the type of cause-effect relationships that apply to your project?

○ Yes ○ No

If yes, select the PoEs that apply to your project.

- ☐ Addition or removal of aquatic vegetation
- ☐ Change in timing, duration and frequency of flow
- ☐ Cleaning or maintenance of bridges or other structures
- ☐ Dredging
- ☐ Excavation
- ☐ Fish passage issues
- ☐ Grading
- ☐ Marine seismic surveys
- ☐ Organic debris management
- ☐ Placement of marine finfish aquaculture site
- ☒ Placement of material or structures in water
- ☐ Riparian Planting
- ☐ Streamside livestock grazing
- ☐ Structure removal
- ☐ Use of explosives
- ☒ Use of industrial equipment
- ☐ Vegetation Clearing
- ☒ Wastewater management
- ☐ Water extraction

Will there be changes (i.e., alteration) in the fish habitat*? ○ Yes ◉ No ○ Unknown

If yes, provide description.

Will the fish habitat alteration be permanent*? ○ Yes ○ No ○ Unknown

Is there likely to be destruction or loss of habitat used by fish? ○ Yes ◉ No ○ Unknown

What is the footprint (area in square meters) of your project that will take place below the high water mark*?

N/A

Is your project likely to change water flows or water levels? ○ Yes ◉ No ○ Unknown

If your project includes withdrawing water, provide source, volume, rate and duration.

N/A

If your project includes water control structure, provide the % of flow reduction.

N/A

If your project includes discharge of water, provide source, volume and rate.

Treated effluent from Northern Pulp Nova Scotia market bleached kraft pulp mill, 65,000 to 85,000 cubic metres per day

Will your project cause death of fish? ○ Yes ◉ No ○ Unknown

If yes, how many fish will be killed (for multi-year project, provide average)? What species and lifestages?

Are there aquatic species at risk (http://www.sararegistry.gc.ca/species/aquatic_e.cfm) present? If yes, which ones?

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Species of concern: Atlantic Salmon and Striped Bass (outside of discharge area)

What is the time frame of your project?

The construction will start on 01/01/2019 and end by 06/01/2019

If applicable, the operation will start on MM/DD/YYYY and end by MM/DD/YYYY

If applicable, provide schedule for the maintenance

If applicable, provide schedule for decommissioning

Are there additional effects to fish and fish habitat that will happen outside of the time periods identified above? ○ Yes ◉ No

(If yes, provide details)

Have you considered and incorporated all options for redesigning and relocating your project to avoid negative effects to fish and fish habitat?

◉ Yes ○ No

If yes, describe.

Please see attached file 11 1112A - Details of Project Area.pdf, which identifies fisheries present in the area and show how the outfall avoids them. Data taken from a preliminary receiving water study (2D & 3D modelling), which is currently being completed

Have you consulted DFO's Measures to Avoid Harm to Fish and Fish Habitat (http://www.dfo-mpo.gc.ca/pnw-ppe/measures-mesures/index-eng.html) to determine which measures apply to your project?

◉ Yes ○ No

Will you be incorporating applicable measures into your project? ◉ Yes ○ No

If yes, identify which ones. If No, identify which ones and provide reasons.

Relevant measures associated to Operation of Machinery, Fish Protection, Erosion and Sediment Control, Contaminant and Spill Management,Project Planning and Timing will be incorporated in the construction of the outfall

Have you considered and incorporated additional best practices and mitigation measures recommended in relevant guidelines to avoid negative effects to fish and fish habitat?

○ No ○ Yes

If Yes, include a list of the guidelines being used to avoid negative effects to fish and fish habitat.

2D and 3D computer modelling of the new outfall location's anticipated impact is being carried out and final outfall location will be based on work product. Federal EEM (Pulp and Paper Effluent regulations) program will monitor this impact once outfall is operational

Are there any relevant best practices or mitigation measures that you are unable to incorporate? ○ Yes ◉ No

(If yes, identify which ones.)

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Can you follow appropriate Timing Windows (http://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/index-eng.html) for all your project activities below the High Water Mark*?

(•) Yes ( ) No

(If no, provide explanations.)

What residual effects to fish and fish habitat do you foresee after taking into account the avoidance and mitigation measures described above?

None

F) Signature

I, Guy Martin (print name) certify that the information given on this form is to the best of my knowledge, correct and completed.



Signature

25/05/2017

Date

Information about the above-noted proposed work or undertaking is collected by DFO under the authority of the *Fisheries Act* for the purpose of administering the fisheries protection provisions of the *Fisheries Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in the Personal Information Bank DFO-PPU-680. Under the *Privacy Act*, Individuals have a right to, and on request shall be given access to any personal information about them contained in a personal information bank. Instructions for obtaining personal information are contained in the Government of Canada's Info Source publications available at www.infosource.gc.ca or in Government of Canada offices. Information other than "personal" information may be accessible or protected as required by the provision of the *Access to Information Act*.

**All definitions are provided in Section G of the Guidance on Submitting a Request for Review*

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Guidance on Submitting a Request for Review

This document explains the requirements for a Request for Review by DFO under the fisheries protection provisions of the *Fisheries Act*. To determine whether you should request a review, follow the steps for proponent Self-Assessment on DFO's Projects Near Water webpage (http://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html).

Incomplete Requests for Review will be returned to the applicant without review by DFO. All information requested must be provided. If you attach documents to your application with additional information, you must still provide appropriate summaries in the spaces provided on the application document or your application will be considered incomplete.

Section A: Contact Information

Provide the full legal name of the proponent and primary mailing address for the proponent. When the proponent is a company, identify the full legal registered name of the company.

If applicable, also provide the contact information of the duly authorized representative of the proponent. Please note that a copy of correspondence to Contractor/Agency/Consultant will also be sent to the Proponent.

Section B: Description of Project

This information is meant to provide background about the proposed project. All components of the proposed project in or near water, must be described.

Proponents should provide information about all appropriate phases of the project, i.e., the construction, operation, maintenance and closure phases for the proposed project.

All details about the construction methods to be used, associated infrastructure, permanent and temporary structures, building materials to be used, machinery and equipment to be used must also be provided. For example, the construction of **permanent structures** may require the construction of temporary structures such as temporary dikes, in conjunction with other associated activities like the withdrawal of water, land clearing, excavation, grading, infilling, blasting, dredging, installing structures, draining or removing debris from water. Similarly, the equipment and materials to be used may include hand tools, backhoes, gravel, blocks or armor stone (provide the average diameter), concrete (indicate if pre-cast or poured in-water), steel beams or wood.

When physical structures in or near water are proposed, provide the plan and specifications of those works which would require a review.

Section C: Location of the Project

The purpose for this information is to describe and illustrate the location of the proposed project, and to provide geographical and spatial context. The information should also facilitate an understanding of how the project will be situated in relation to existing structures.

The details to be provided must include:

- Coordinates of the project (e.g., Latitude and Longitude or Universal Transverse Mercator Grid coordinates);
- A map(s), site plan, or diagrams indicating the high water mark and the location, size and nature of proposed and existing structures (e.g., floating or fixed), landmarks and proposed activities. In a marine setting, it may be helpful to depict the approximate location of the proposed development on a nautical chart or showing the relation of the site to sea marks or other navigational aids. These plans, maps or diagrams should be at an appropriate scale to help determine the relative size of the proposed structures and activities, the proximity to the watercourse or waterbody and the distance from existing structures;
- The community nearest to the location of the proposal as means to provide a general reference point. When possible, proponents should use geographical names recognized by the Geographical Names Board of Canada (http://www.nrcan.gc.ca/earth-sciences/geography-boundary/geographical-name/11680).
- If available, provide aerial photographs or satellite imagery of the water source(s) and waterbody(ies);
- Names of the watershed(s), water source(s) and/or waterbody(ies) likely to be affected by the proposal; and
- Brief directions to access the proposed project site.

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Section D: Description of the Aquatic Environment

Proponents must describe the environmental context and aquatic resources present at the proposed site. The information must identify the current state of the fish and fish habitat prior to the carrying on of the project.

It is important to include information about the fish species present, the biological, chemical, physical features present (habitat characteristics), and the fish life-cycle functions (fish characteristics).

The spatial scope for assessing fish and fish habitat should encompass the direct physical footprint of the project, and the upstream and downstream areas affected.

As an example, the following is a non-exhaustive and non-prescriptive list of some common attributes which may characterize the aquatic environment:

- Type of water source or watercourse (groundwater, river, lake, marine, estuary, etc.);
- Characteristics of the water source or waterbody could include:
  - Substrate characterization - describe the types of substrate (e.g., bedrock, boulder, cobble, gravel etc.), identify the predominant substrate type (e.g., 80% cobble, 20% gravel etc.) and provide maps of the substrate;
  - Aquatic and riparian vegetation characterization - identify the prevalent types of vegetation (e.g. rooted, submerged, emergent, etc.), identify the relative abundance of the vegetation (e.g., 10% cattails, 80% grass, 10% sedge) , indicate the predominant vegetation (e.g., by species or types) and identify the vegetation densities (e.g., type of vegetation/ area);
  - Flow characterization - specify if the flow is controlled or if it is natural, identify if the flow is permanent or intermittent, identify the current and tide (marine environment) etc.;
  - Physical waterbody characterization - identify the average depth of water for water bodies, identify bathymetry of water bodies, provide bathymetric maps where available, channel width (determine the width of the channel from the high water mark), slope ;
  - Water quality characterization - (e.g., annual or average pH, salinity, alkalinity, total dissolved solids, turbidity, temperature etc.);
  - Biological water quality characterization - (e.g., benthic macro-invertebrates, zooplankton, phytoplankton, etc.)
- Fish species characterization - identify the fish species (including molluscs, crustaceans, etc.) known or suspected to be in the area, predator prey relationships etc. Identify what source of information was used and to determine the presence of fish in that area; and
- Estimate the fish abundance - estimate the number of fish present, estimate the year class for each species etc.

There are many different methods and attributes available to characterize fish and fish habitat. Proponents must describe all sources of information used, all fish and environment sampling techniques used, all modelling techniques used and all other approaches used to define the fish and fish habitat. Proponents are encouraged to use recognized fisheries inventory methods such as those approved by DFO or provinces and territories, or scientifically defensible methodologies and techniques whenever possible.

Whenever possible, proponents should support descriptions of the aquatic environment with the use of detailed drawings, such as plans or maps and photographs of the habitat features. In an offshore marine setting, photos may not be useful to depict the proposed development site. Instead describe and/or sketch the specific features of the sea floor which may include the presence of submarine features such as canyons, cliffs, caverns, etc.

Section E: Potential Effects of the Proposed Project

The objective of this section is to identify all anticipated effects on fish and fish habitat likely to be caused by the project. Proponents should consider all mitigation or avoidance techniques.

The description must include qualitative and/or quantitative information about the predicted/potential effects to fish species and fish habitat. Some examples of likely effects may include mortality to fish, changes to the life stages of fish affected, area of habitat loss, change to flow, changes to habitat function, reduction in prey availability etc.

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The spatial scope of the aquatic effects assessment would include the direct physical "footprint" of the proposed project, and any areas indirectly affected, such as downstream or upstream areas. This may also include areas in or on the water, on the shoreline, coast or bank(s) (i.e., in the riparian zone).

The assessment must include the following attributes:

- Identification of all fish species affected by the proposed project ;
- Identification of the type of fish habitat affected (e.g., spawning habitat - gravel and cobble, feeding and rearing areas - side channel slough, small tributaries, etc.), estimate of the affected area (e.g., square meters or hectares);
- Of the affected fish, identify the life stages affected (e.g., juvenile, yearling, adult etc.);
- Description of the effect (e.g., mortality to fish from entrapment, delayed migration of spawning adults, reduction in prey availability, etc.)
- Probability of the effect - this is the likelihood of the effect occurring (e.g., probability of fish strike from turbines for specific fish sizes, probability of sediment plume within a distance from source, etc., or qualitative assessment: low, medium, high)
- Magnitude of the effect - this is the intensity or severity of the effect (e.g., total number of fish affected, or qualitatively assessment: low, medium, high).
- Geographic extent of the effect - this is the spatial range of the effect (e.g., localized to 100m from the work, channel reach or lake region, entire watershed etc.); and
- Duration of the effect - this is the temporal period for which the effect will persist (e.g., duration of delay to fish migration in hours, days, months or years).

The information to be provided must also describe the methods and techniques used to conduct the assessment. As much as possible, methods and techniques used should be scientifically defensible.

The schedule should, at minimum, identify the proposed start and end dates for carrying out each proposed activity, and where applicable, identify the respective phase of the proposal; i.e., the construction, operation, maintenance and closure phases. In some cases, in order to provide additional context, it may be relevant to identify other information such as the expected life span of permanent and temporary structures.

Proponents must provide comprehensive information about all best available measures and standards that are proposed to avoid or mitigate potential serious harm.

Residual serious harm to fish is any serious harm to fish remaining after the consideration of the application of proposed measures or standards to avoid or mitigate serious harm.

It is important to clearly describe and quantify residual serious harm because DFO will use this information as part of its decision making on whether an authorization is required under subsection 35(2)(*b*) of the *Fisheries Act*.

Section F: Submission and Signature

The proponent must sign the application. A signed original of the Request for Review must be provided to the regional DFO office (http://www.dfo-mpo.gc.ca/pnw-ppe/contact-eng.html), even if an electronic copy was sent by email. Should the review of your project indicate that residual serious harm to fish is likely, the information provided in the Request for Review document can be referred to in the subsequent Application for an Authorization under Paragraph 35(2)(*b*) of the *Fisheries Act*.

Section G: Definitions

Emergency circumstance: If your project must be conducted in response to an emergency, you may apply for an Emergency Authorization. The emergency situations are:

- The project is required as a matter of national security
- The project is being conducted in response to a national emergency where special temporary measures are being taken under the federal *Emergencies Act*

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- The project is required to address an emergency that poses a risk to public health or safety or to the environment or property.

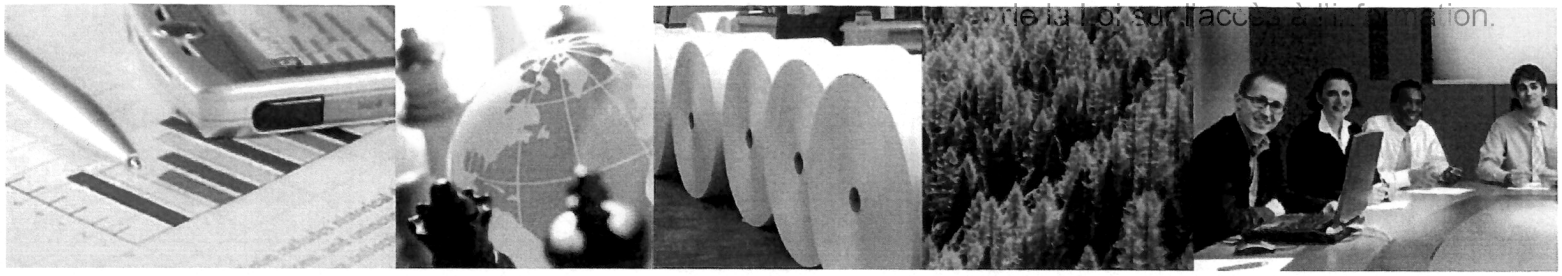
Fish habitat: Means spawning grounds and any other areas, including nursery, rearing, food supply and migration areas, on which fish depend directly or indirectly in order to carry out their life processes.

High Water Mark: The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to leave a mark on the land.

Permanent alteration to fish habitat: An alteration of fish habitat of a special scale and a duration that limits or diminishes the ability of fish to use as spawning grounds for nursery or rearing, or as food supply, or as a migration corridor in order to carry out one or more of their life processes.

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KSH Consulting



Northern Pulp Nova Scotia
New Glasgow, NS

Preliminary Engineering for Effluent Treatment Plant Replacement
Technical Information Session with NSE

Report No.: 11 1112A

February 2017

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KSH CONSULTING

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I. Agenda

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KSH Consulting

Agenda

- Introduction and expectations;
- Review of the overall process for the study;
- Projected impact of project on effluent quality and implementation issues.

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II. Introduction and Expectations

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KSH
Consulting

Brief Company Profile

- KSH Solutions Inc. is a privately-owned Canadian consulting, engineering and EPC/EPCM service company, founded in 1923 in Montreal;
- KSH operates globally from its head office located in Montreal, Canada and its offices in Toronto, Canada and São Paulo, Brazil with a strong track record in Europe, Asia (particularly South East Asia), Latin America, Oceania and Africa;
- KSH has extensive experience and works almost exclusively within the forest products industry and related fields, such as energy, chemicals, bio-refinery and environment;
- Our international activities allow KSH to stay abreast of the forest industry trends and developments in the key forest industry regions of the world;
- KSH has the skills, experience and organization to assist clients to improve their asset performance and to develop and execute projects of all sizes and complexities, with its consulting, engineering, and EPC/EPCM expertise customized to meet client needs.

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II. Review of the Overall Process for the Study

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KSH Consulting

Scope of Project

There are two distinct aspects to this project:

1: Determination of Optimum Technical Concept

- ***Project Criteria Definition***
  - Characterize current mill effluent;
  - Identify potential hydraulic and organic loading reduction opportunities;
  - Assess techno-economic feasibility of these opportunities.
- ***Site and Infrastructure Review***
  - Review potential locations for new treatment facility, including geotechnical issues related to the site;
- ***Key Process Technology Assessment and Selection***
  - Assess various effluent treatment technologies;
  - Determine best effluent treatment solution, based on effluent characteristics, in-mill reduction potential and technology assessment;
  - Assess effects of the technology selection of projected final effluent quality
- ***Preliminary Receiving Water Study***
  - Assess, via modelling, how the new effluent may impact local waterways and how to minimize this effect;
  - Assess design characteristics and location of a new, submerged effluent outfall.
- ***Incorporation of Liquid Biofuel Technology (future consideration)***
  - Perform a high level study, with mass and energy balances, on the incorporation of a manufacturing system that would utilize, among other feedstocks, the sludge produced by the new treatment facility to produce liquid biofuel.

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Deliverables for Phase 1

- Selection of in-mill projects to be implemented (techno-economic evaluation);
- Selection of effluent treatment system technology to be implemented;
- Selection of effluent treatment system location;
- Selection of new effluent outfall routing, end point and diffusion technology (via receiving water study).

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Scope of Project *(cont'd)*

2: Preliminary Engineering (+/-10%)

- ***Technical Definition of Project***
  - For all engineering disciplines (mechanical/piping, civil/architectural, electrical/instrumentation)
- ***Capital Cost Estimating (accuracy of +/- 10%)***
  - Requests for Quotations;
  - Comparison of Tenders;
  - Bill of Quantities;
  - Equipment, piping, motor and instrument lists;
  - Local contractor input in labour estimates;
  - Assessment of indirect costs.
- ***Project Implementation Plan and Schedule***
  - Project organization, structure, planning and scheduling
  - List of potential construction packages.
- ***Preliminary Engineering Study Report***

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Deliverables for Phase 2

- Mass and energy balances for the new effluent treatment plant;
- Process design criteria by department;
- Preliminary Process and Instrumentation Diagrams (P&IDs);
- Geotechnical report for the new effluent treatment plant location;
- Reviewed and updated technical specifications for main equipment;
- Process description by area;
- Mill site layout;
- Departmental layouts;
- Master equipment list;
- Electrical single line diagram;
- Bill of quantities;
- Project schedule; and
- Capital cost estimate.

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Project Milestones

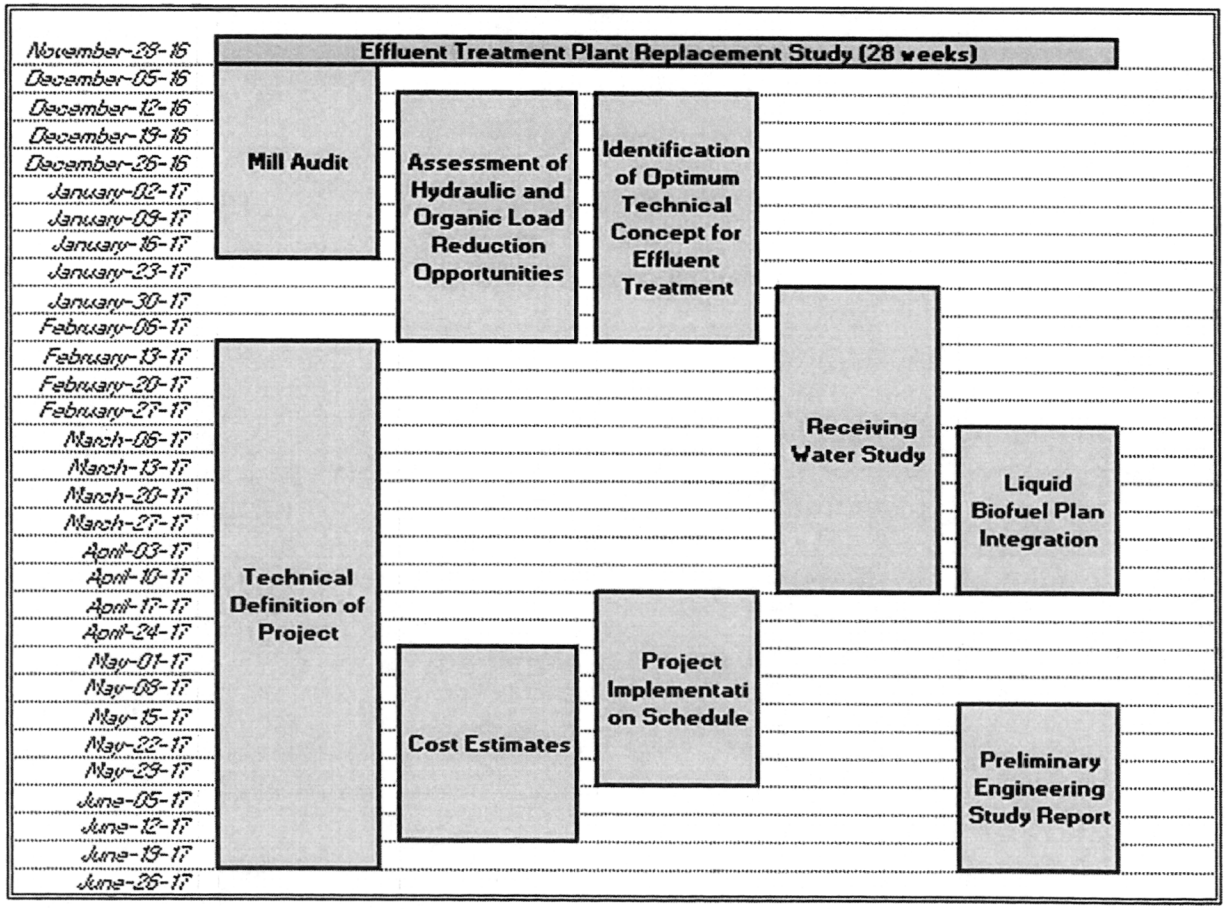
December 7-8, 2016	Project kick-off meeting / Mill Audit
January 30, 2017	Begin Receiving Water Study *(kick-off meeting February 9th)*
Week or February 6, 2017	Report Review, Determination of Optimum Technical Concept
Week of February 20, 2017	Issue Inquiries, Major Equipment
March 2017	Geotechnical Study / Site Investigation (engineering disciplines)
March 30, 2017	Preliminary Report, Receiving Water Study
April 2017	Meeting with Local Contractors (constructability/pricing)
Week of April 10, 2017	Final Report, Receiving Water Study
May 2017	Capital Cost Estimates
May 30, 2017	Preliminary Study Report
June 15, 2017	Final Study Report

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Project Implementation Schedule

Preliminary Project Implementation Schedule - Effluent Treatment Plant Replacement
Northern Pulp Nova Scotia Corporation

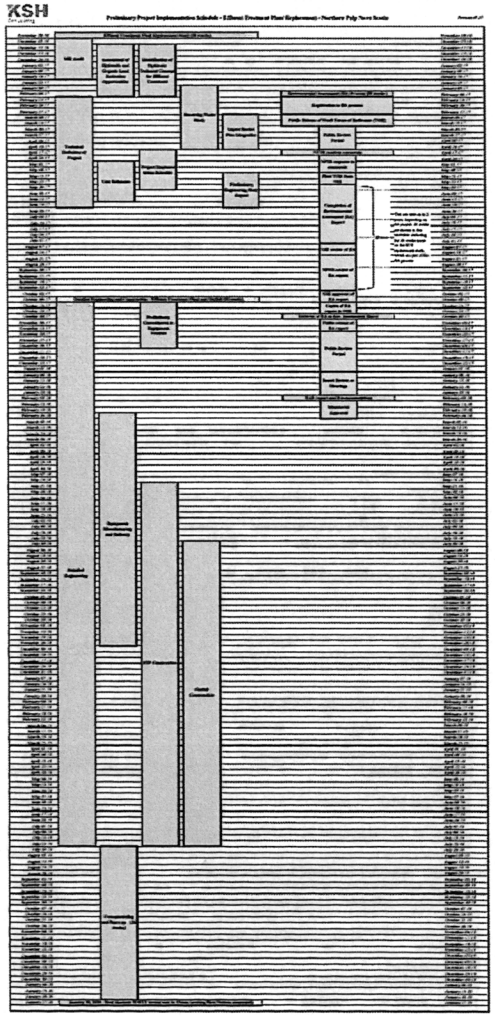


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Project Implementation Schedule *(cont'd)*



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Recent COD / Flow Survey of NPNS

	Flow			COD		Bleach Plant Contribution	
	(m^3/day)	% of Total	(ppm)	kg/d	% of Total	Flow	COD
Landfill Leachate Pump Station	14	0.02%	1,100	16	0.02%		
Sand Separator Dumping	11	0.02%	6,900	75	0.11%		
Esco Filter	1,363	1.95%	3,450	4,702	7.07%		
D_0 Seal Tank	9,785	13.98%	1,500	14,677	22.07%		
E_{OP} Seal Tank	5,724	8.18%	5,750	32,911	49.50%		
D_1 Seal Tank	3,925	5.61%	160	628	0.94%	**30.5%**	**74.7%**
E_2 Seal Tank	1,635	2.34%	820	1,341	2.02%		
D_2 Seal Tank	245	0.35%	500	123	0.18%		
Dept. 4 Sewer	7,300	10.43%	270	1,971	2.96%		
Modo Wash Water	545	0.78%	110	60	0.09%		
Foul Condensate to Stripper	480	0.69%	8,100	3,886	5.84%		
Power Boiler Scrubber Effluent	7,904	11.29%	44	348	0.52%		
Sluice Water to Ash Pond	1,090	1.56%	120	131	0.20%		
Evaps Sewer	1,036	1.48%	3,000	3,107	4.67%		
Recaust Main Sewer	2,500	3.57%	59	148	0.22%		
Calculated total	**43,556**	**62.2%**	**1,472**	**64,122**	**96.4%**		
Total Mill Effluent	***69,991***		***950***	***66,491***			

- The survey shows that the largest opportunity for organic loading reduction is at the bleach plant, while several departments seem to show proportionally elevated water consumption.

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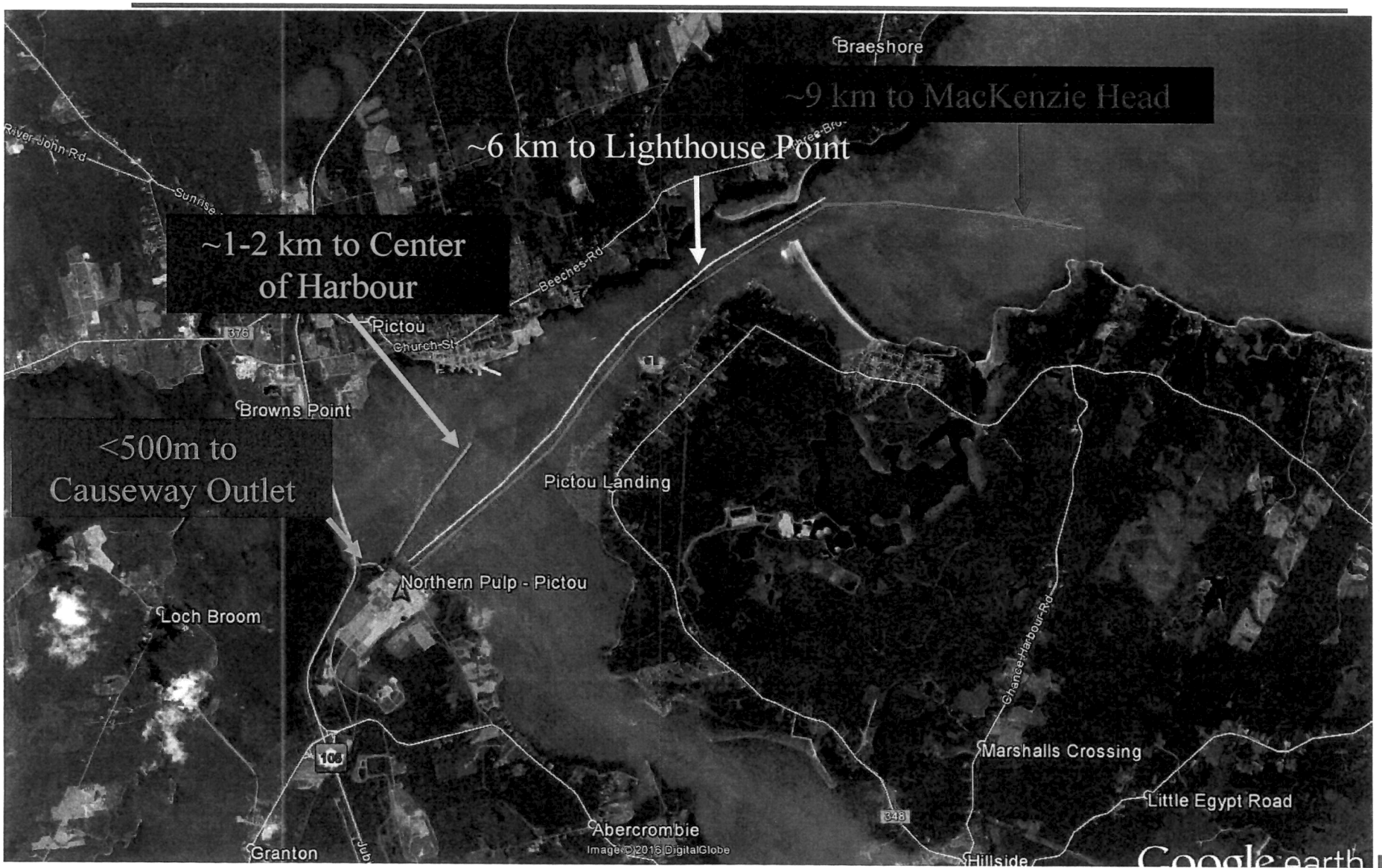
Receiving Water Study and Outfall Routing

- The key objective of the receiving water study is to determine the optimum location for the new mill outfall discharge among four possible discharge points:
  - Approximately 500 m from the Causeway Outlet;
  - Between 1 and 2 km past the mill towards the centre of Pictou Harbour;
  - Approximately 6 km from the mill at Lighthouse Point; and
  - Approximately 9 km from the mill at MacKenzie Point.
- It is possible that alternate discharge locations may be proposed, based on the results of the study and discussions with vendors on possible treatment plant performance levels.

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Potential Outfall Routings to be Studied



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Receiving Water Study and Outfall Routing *(cont'd)*

- Stantec was hired to carry out the study, which will consist of both far-field (MIKE 21 Coupled Model) and near-field (Cormix) modelling of the impact of the effluent on Pictou Harbour;

- The input to the model will consist of:
  - Local data defining the conditions in Pictou Harbour; and
  - Effluent quality data, which will have to be set by the mill in the absence of more precise regulatory guidelines.

- Several iterations will be run to identify the optimum discharge point, outfall routing as well as the most economically reliable end-of-pipe diffuser configuration;

- Changes in final effluent quality parameters will require additional modeling runs, which will bring about:
  - Added modelling costs;
  - Lost time in preliminary design of both the outfall and the effluent treatment plant;
  - Delays in approval of the project by NSE; and
  - Delays in detailed engineering, construction and start-up of the effluent treatment system

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III. Projected Impact of Project on Effluent Quality and Implementation Issues

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Typical Regulatory Considerations to Changes in Effluent Limits in Other Jurisdictions

- The typical triggers to changing regulated effluent limits in North American jurisdictions are:
  - Age of facility, reflecting the level of "state-of-the-art" manufacturing technology present at the mill:
    - Newer mills would *de facto* include these newer processes (extended cooking, wash presses, etc.);
    - e.g. pre- and post 1992 for Quebec;
  - Major changes to technology or manufacturing processes:
    - Tighter standards are applied to facilities that implement this production technologies;
    - Limits to facilities not adopting these technologies would remain unchanged;
    - Approach present in the US, Alberta, Ontario and Quebec.
  - Receiving water impact analysis:
    - Site-specific limits are often set if it can be demonstrated that effluents meeting the regulated limits in place cause an adverse effect on the receiving waters;
    - BC's entire regulatory process is based on this principle;
  - Major production increases:
    - Facilities making major investments will usually be required to meet tighter environmental standards, since they would be expected to implement more efficient production technologies;
    - Approach present in the US, Alberta and Quebec.
    - This approach is also present in the US (TMDL program), Ontario and Quebec (depollution attestation program).

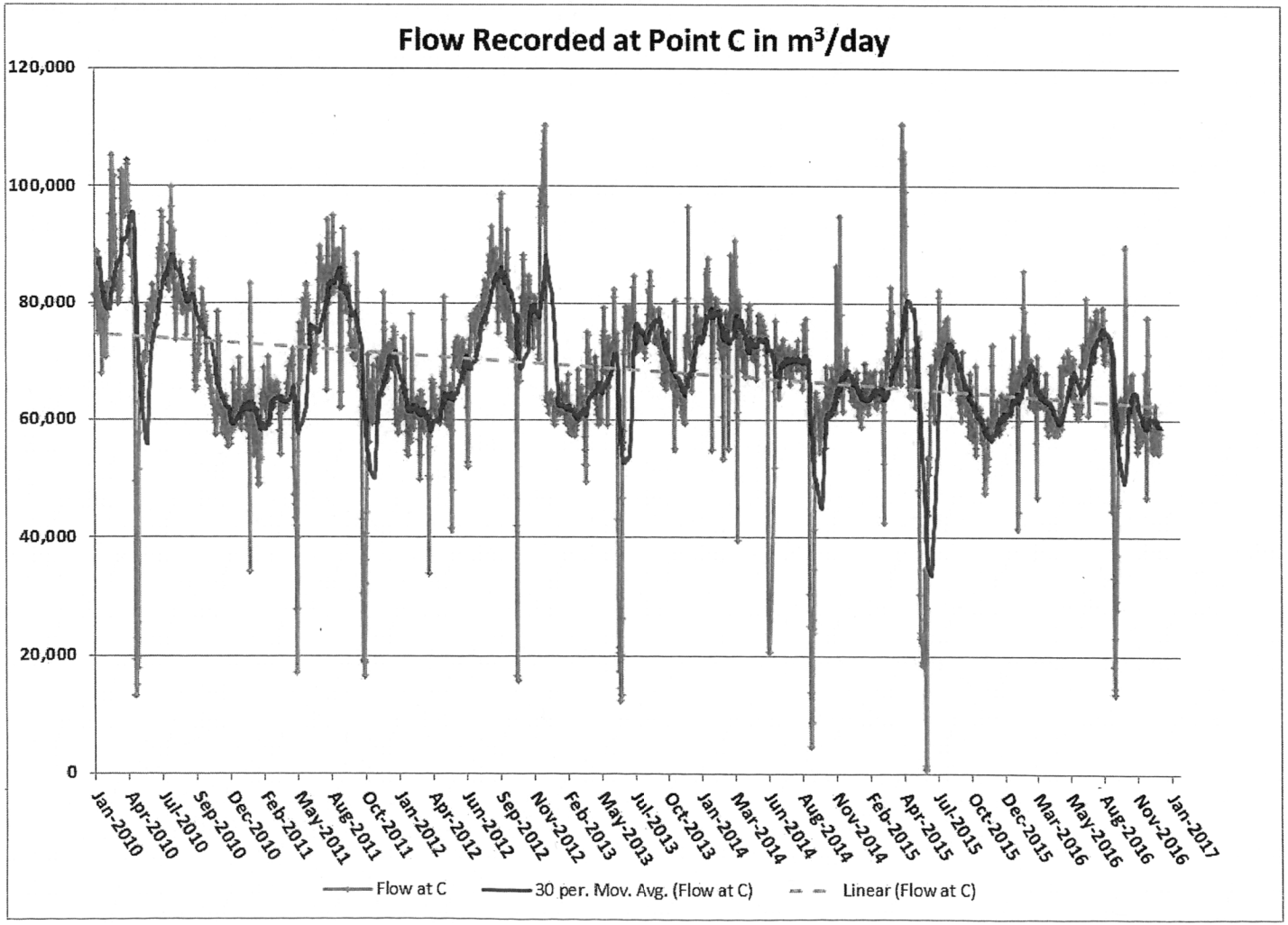
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Characterization of Effluent – Flow Rate Last 6 Years

Mill Effluent Flow – Point C Flow

- Slight downward trend, consistent high peaks over 80,000 m^3/d very rare in last 2 years.



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Water Reduction

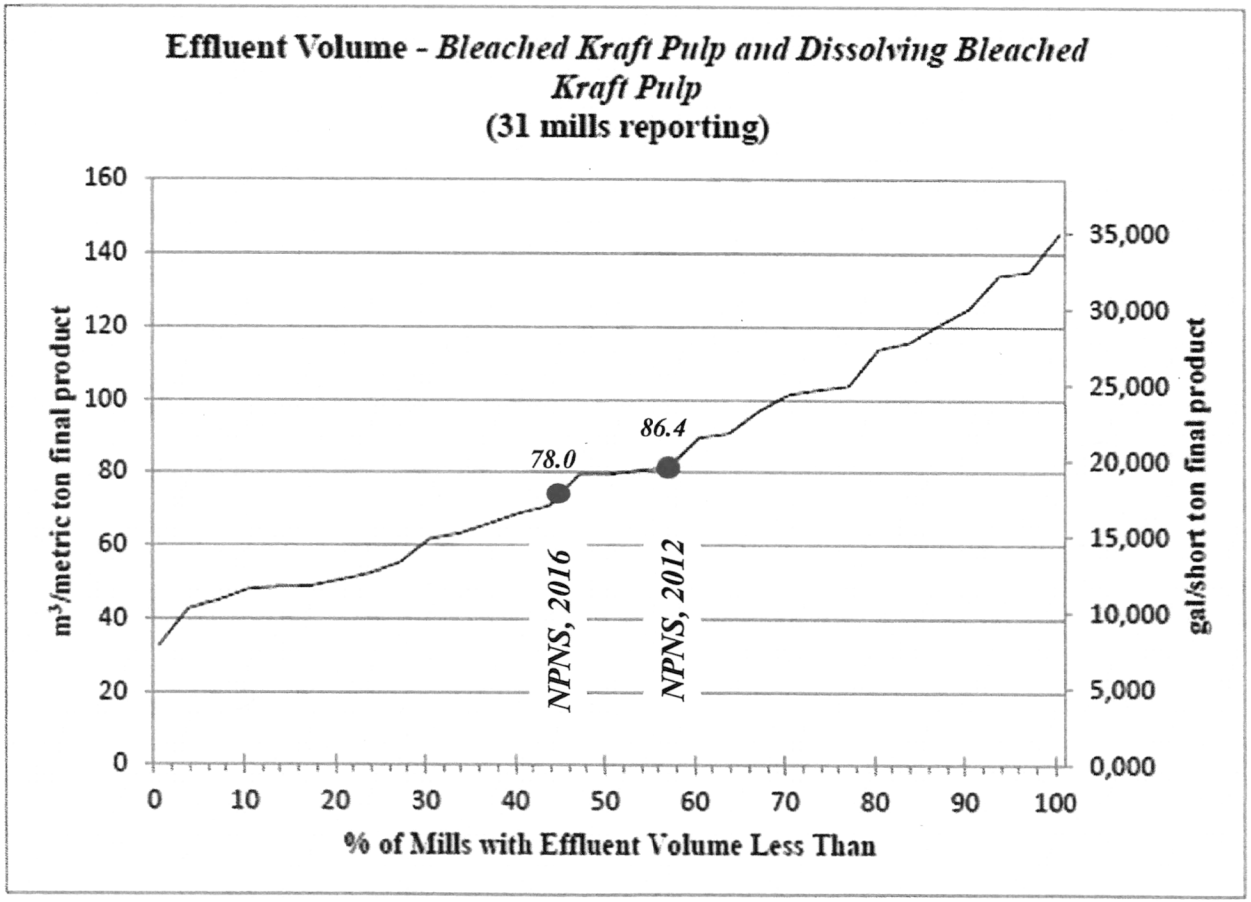
- Summer water consumption opportunity: cooling tower;
- Increasing pollutant concentration too high in the aeration system can have an adverse effect on the treatment efficiency and in the mixing zone at the outfall diffuser outlet
  - Higher nutrient requirement;
  - Higher aeration energy requirements;
  - Increases in effluent temperature will increase the potential for the system to generate odours;
- Effluent treatment system needs to be designed by keeping a balance between"
  - Capital costs (through lower effluent volume); and
  - Operating costs (higher requirements through increased concentrations).

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Benchmarking Water Use

- Use of water at NPNS is within the Industry average in Canada for a mill of this type, irrespective of vintage;
- Water use has also improved since 2012.



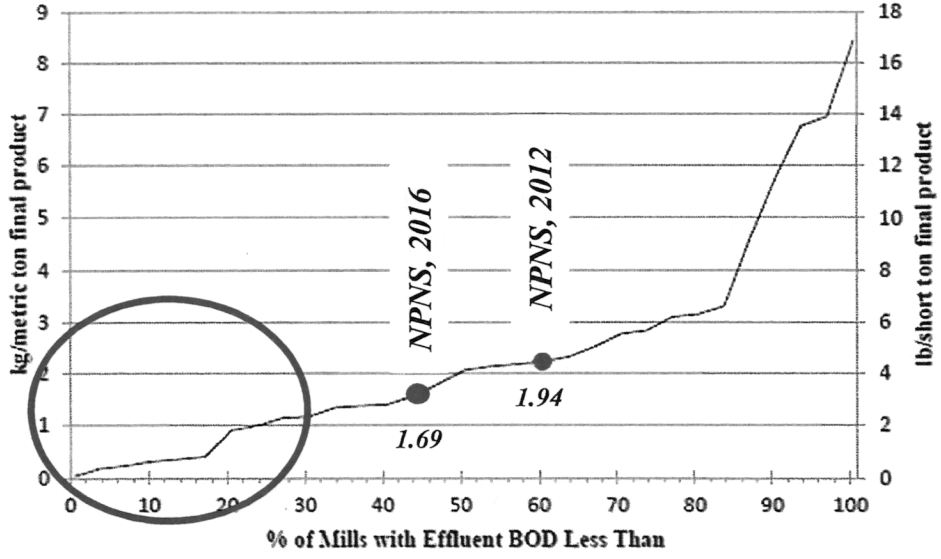
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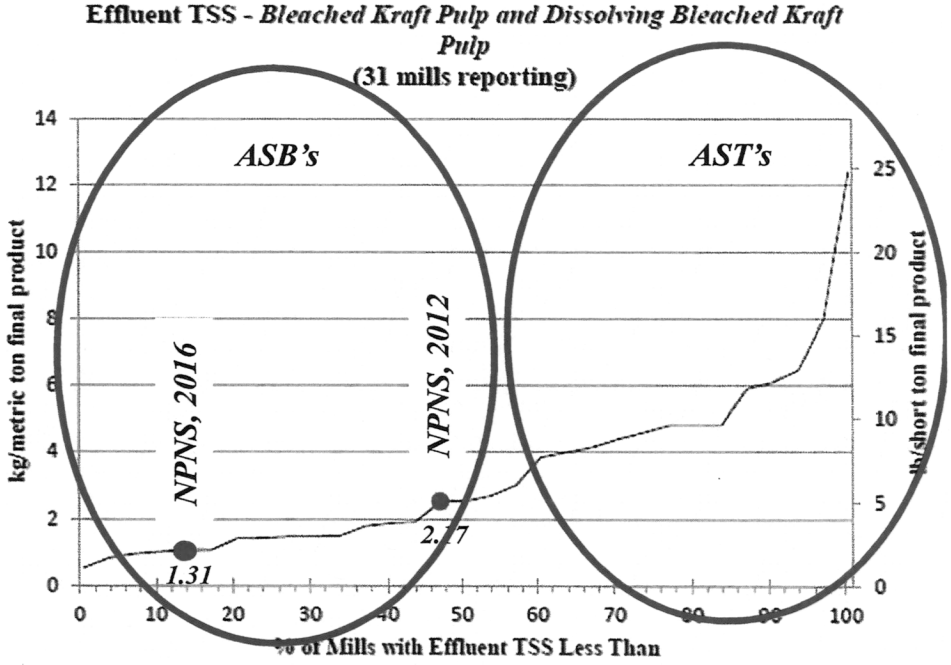
KSH Consulting

Benchmarking Organic Loading

- BOD losses are within the Industry average in Canada for a mill of this type, irrespective of vintage and have improved significantly since 2012;
- TSS losses have also improved and are now among the best in the Canadian Industry;
- COD, though measured at every mill, is not reported to regulated authorities and, as such, very difficult to benchmark.



Newer (post-1992) mills



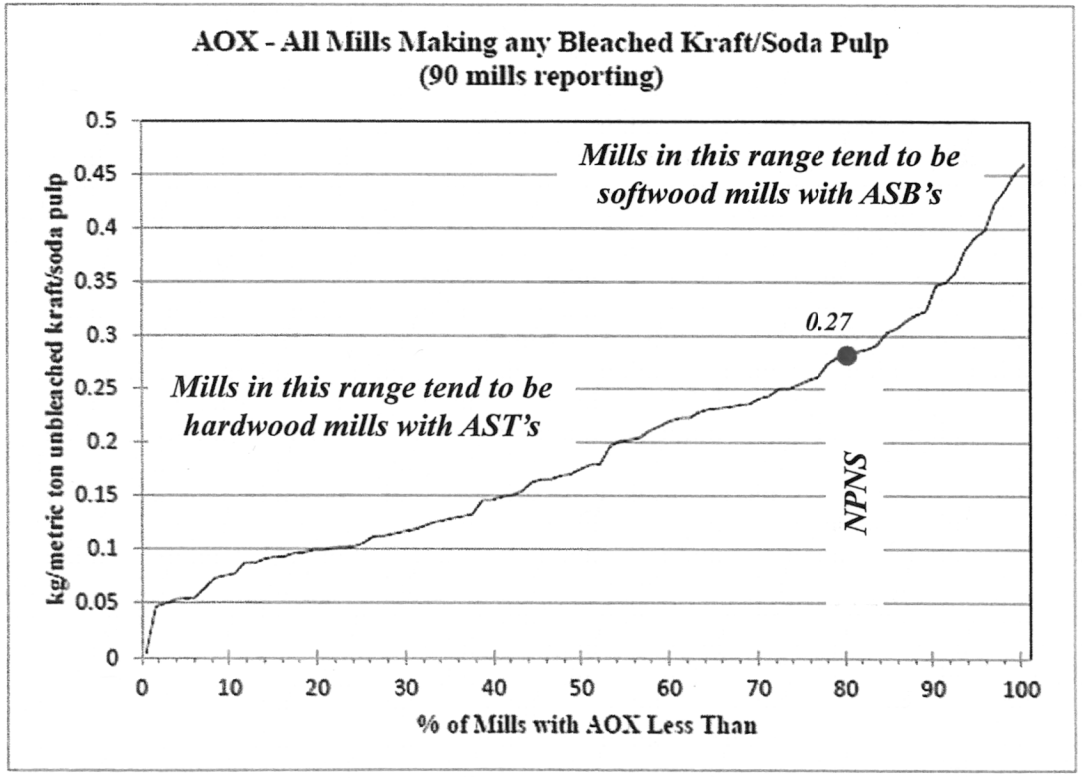
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Benchmarking Chlorinated Organic Discharges

- Adsorbable Organic Halides (AOX) is a measure of the level of chlorinated organic compounds in the effluent of bleached chemical pulp mils
- AOX discharges have improved significantly and are now well within the Industry average in Canada;
- This benchmarking graph does not distinguish between furnishes (hardwood/softwood) or the treatment system being used:
  - Softwood kraft tends to yield higher AOX numbers than hardwood kraft;
  - Activated sludge systems tend to treat AOX better than ASB's.



- AOX levels affected by:
  - Cooking process (conventional vs extended cooking);
  - Furnish (softwood vs. hardwood);
  - Bleaching (O_2 delig, 3 vs. 5 stages);
  - Effluent treatment technology (ASB vs AST)

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Limited Organic Loading Reduction Opportunities

	COD		Bleach Plant Contribution	
	kg/d	% of Total	Flow	COD
Landfill Leachate Pump Station	16	0.02%		
Sand Separator Dumping	75	0.11%		
Esco Filter	4,702	7.07%	*Project being implemented*	
D_0 Seal Tank	14,677	22.07%		
E_{OP} Seal Tank	32,911	49.50%		
D_1 Seal Tank	628	0.94%	**30.5%**	**74.7%**
E_2 Seal Tank	1,341	2.02%		
D_2 Seal Tank	123	0.18%		
Dept. 4 Sewer	1,971	2.96%		
Modo Wash Water	60	0.09%		
Foul Condensate to Stripper	3,886	5.84%		
Power Boiler Scrubber Effluent	348	0.52%		
Sluice Water to Ash Pond	131	0.20%		
Evaps Sewer	3,107	4.67%		
Recaust Main Sewer	148	0.22%		
Calculated total	**64,122**	**96.4%**		
Total Mill Effluent	***66,491***			

- Significant improvements in recent years, including 2016;
- No major opportunities except for bleach plant filtrates
- 74% of the COD from bleach plant filtrates is representative of a fairly closed mill;
- Current COD/AOX levels are based on a 75%/25% softwood/hardwood ratio: if customer requirements return to 100% softwood, COD and AOX will increase, as softwoods are harder to pulp/beach than hardwoods;
- COD is not systematically regulated in any North American jurisdiction:
  - One BC mill only;
  - Reported only in Quebec;

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COD / AOX Reduction Potential at Bleach Plant

- These reductions are achieved by reducing the incoming kappa number to the bleach plant:
  - Kappa number is a measure of the remaining lignin in the pulp stream after cooking (the lower the number, the less lignin left to remove during bleaching);
  - Cooking technologies dictate the level of delignification possible prior to bleaching:
    - Fibre quality/strength preservation.
  - Typical results achieved depend of which furnish / cooking technology is used:

Cooking Method	O_2 Delignification	Hardwood Pulp		Softwood Pulp	
		Kappa to Bleach	COD (kg/Adt)	Kappa to Bleach	COD (kg/Adt)
Conventional Cooking	**---**	**18**	**38**	**30**	**63**
Conventional Cooking	O_2 Delignification	13	27	15	32
Modified Cooking	---	16	34	20	42
Modified Cooking	O_2 Delignification	10	15	12	25
Extended Delignification	---	13	26	15	30
Extended Delignification	O_2 Delignification	10	15	10	15

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Other Potential Changes

- Esco filtrate project:
  - 7% reduction in COD at Point A;
  - This corresponds to a 3.5% reduction in final effluent COD
- Increases on production:
  - System will be designed to accommodate a modest increase in production (to 1,100 ADt/d).

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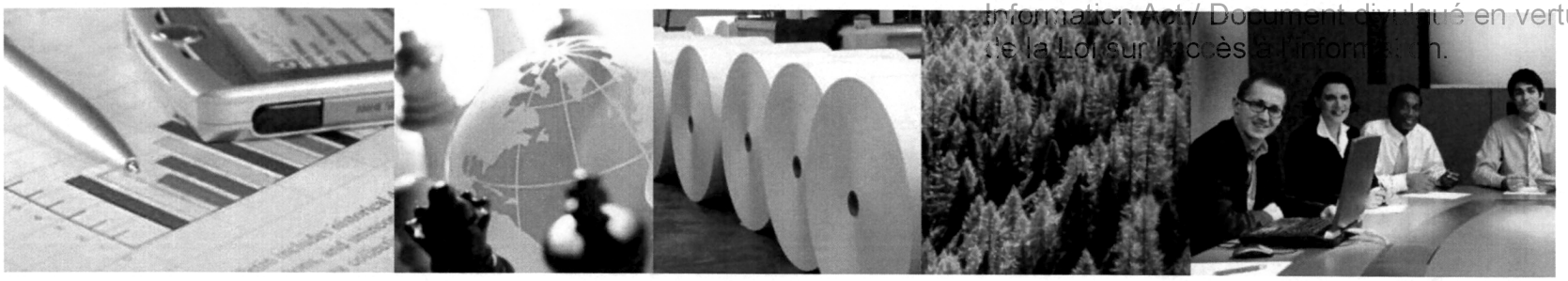
Expected Removal Efficiencies and Comparative Performance

Parameter	ASB	AST	Comments
BOD Removal	50 – 75%	90 - 95%	NPNS: 85 – 90%
TSS Discharge	---	Higher	Higher TSS discharges related to secondary clarifier performance
AOX Removal	Higher	---	Accelerated AST process facilitates AOX removal (more "aggressive" treatment)
Colour Discharge	Higher	---	Longer ASB retention times tend to favour colour generation
Nitrogen Discharge	---	Higher	Higher nitrogen addition rates
Phosphous Discharge	---	Higher	Higher phosphorus addition rates and phosphorus entrainment in TSS (biosolods

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Northern Pulp Nova Scotia
New Glasgow, NS

Effluent Treatment Plant Replacement, with new Marine Outfall
Project Description

Report No.: 11 1112A

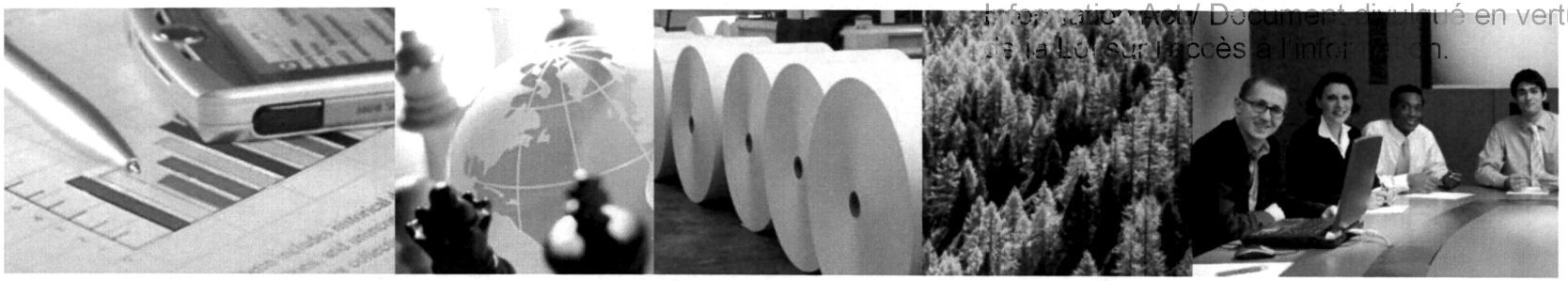
April 2017

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Northern Pulp Nova Scotia
New Glasgow, NS

Effluent Treatment Plant Replacement, with new Marine Outfall
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Project Background

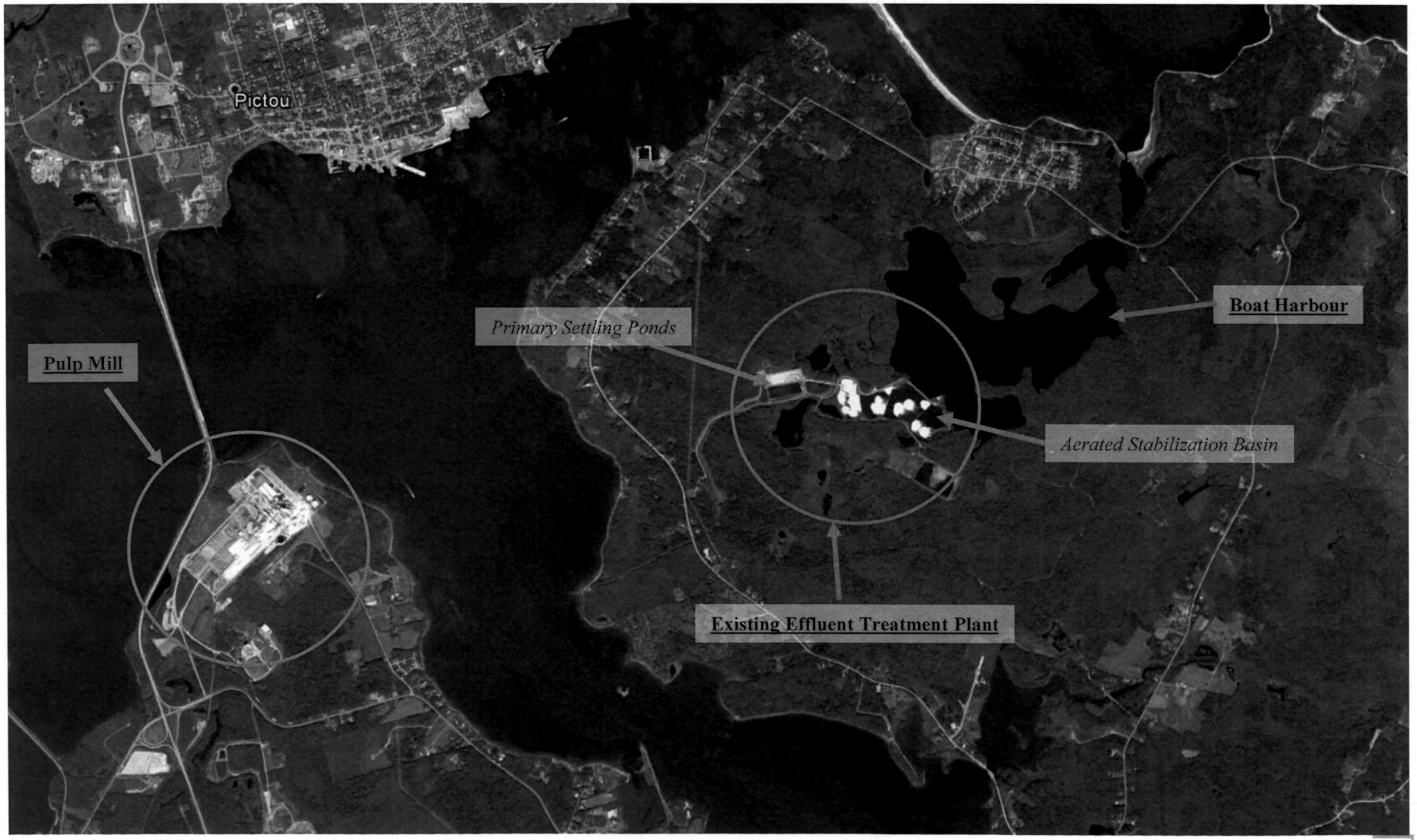
Background

- NPNS operates a kraft mill located on Abercrombie Point, New Glasgow, NS. The mill has been in operation since 1967 and currently produces 280,000 – 300,000 ADMT/yr bleached (ECF) softwood kraft market pulp;
- At the time of construction, the Nova Scotia Government agreed to build and operate a treatment system for the mill's process effluent;
- The system refurbished in 1996, at which time the mill took over operation of the system;
- Effluent treatment system is located 3.5 km east of the mill and consists of sedimentation basins, followed by aeration in a natural basin equipped with baffle curtains. A large, natural final polishing/stabilization basin follows prior to release to the Northumberland Strait.
- The system has met federal and provincial standards since 1996.
- With the introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, the use of the provincially-owned facility for the reception and treatment of effluent from the mill will not be permitted after January 31, 2020.

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Mill Map



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New Treatment System

Process Technology : Activated Sludge Treatment (AST)

- Process Steps:
  - Spill Basin (re-purposed bunker oil storage area);
  - Primary Clarifier;
  - Effluent Cooling;
  - Aeration Basin;
  - Secondary Clarifiers; and
  - Treatment Building (aerators, sludge dewatering etc…).
- Flow would arrive via the existing acid and alkaline sewers to the area near the ash pond;
- Headworks would require minor modification to allow for diversion of the effluent flow to the new spill pond. The existing lift station already has a chamber dedicated to this. Some sluice gates and controls to be added;
- The existing lift station would be used to feed the effluent to the primary clarifier and would include a new mechanical bar screen, which will replace the existing manual screen, to remove large material prior to pumping;
- The clarified effluent would then be cooled indirectly, through a heat exchanger and a clean cooling tower loop;
- Cooled effluent would then be fed to a pre-aeration (selector) basin prior to the main aeration basin where air would be injected using blowers through a subsurface aeration grid; and
- Discharged effluent flows to dual secondary clarifiers for separation of biosolids, with most being recycled back to the front end. Waste sludge would be pumped to new dewatering equipment;
- A new lift station would be built to send the treated effluent to Northumberland Strait via a new, submerged marine outfall.

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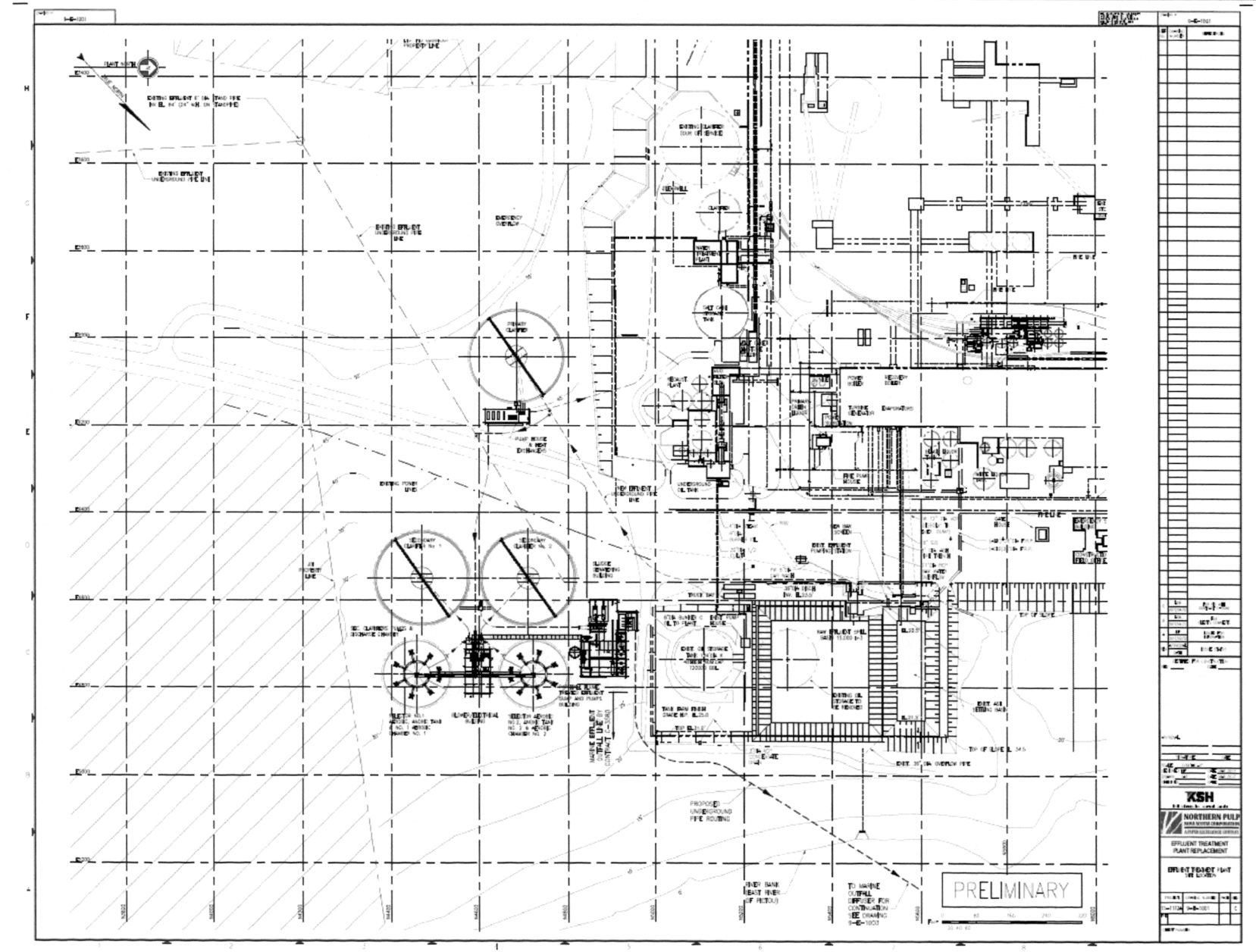
Proposed Location for New Effluent Treatment Plant (ETP)



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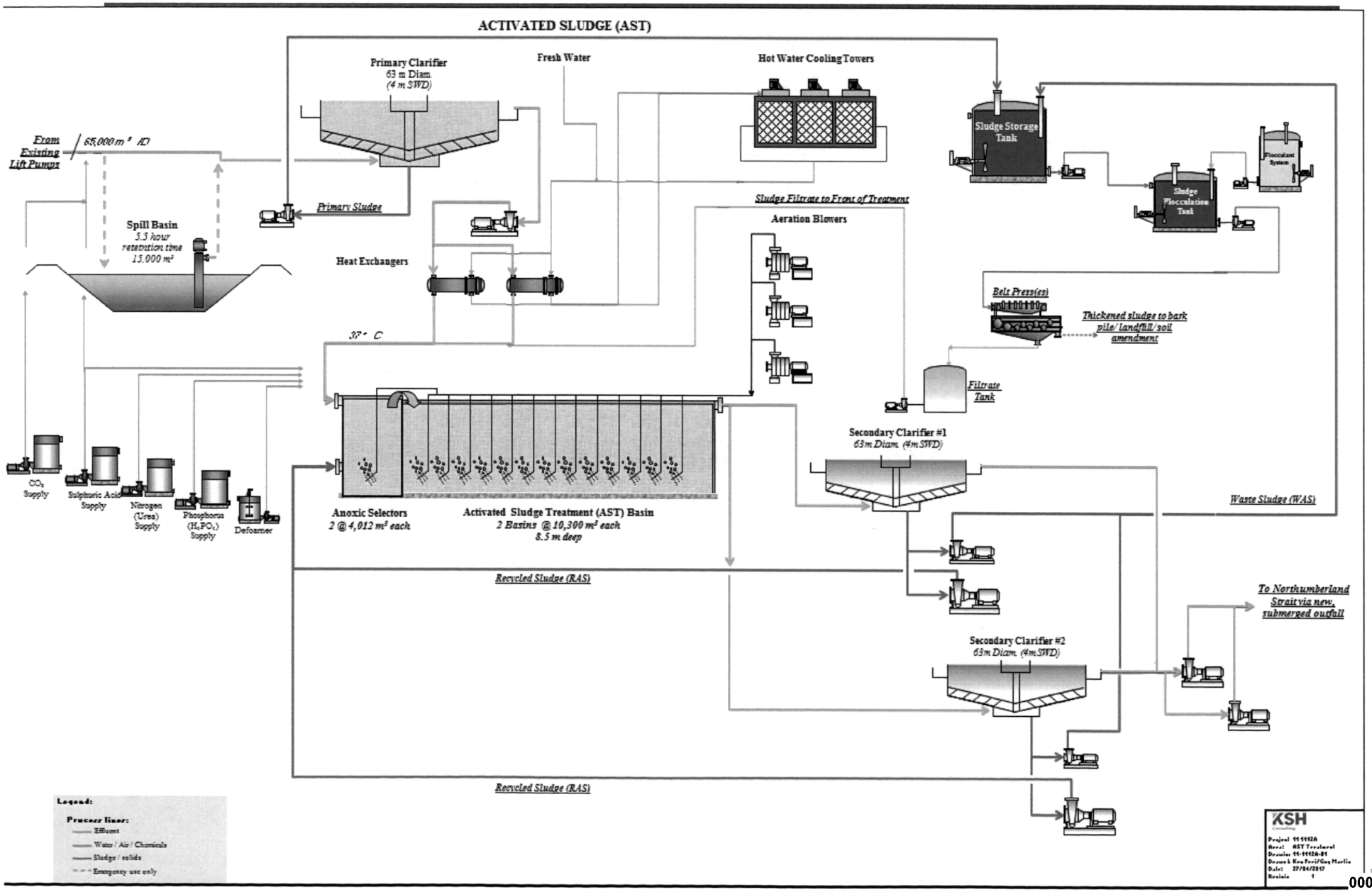
Layout of New ETP *(full drawing available)*



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Process Flow Diagram, New ETP *(full drawing available)*



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pH Control and Spill Management

- Using the existing mill effluent collection system, the raw effluent will be coarse-screened using a new automated bar screen, which will replace the existing manual bar scree and will remove large objects that could otherwise damage the lift station and other subsequent process equipment.
- From there, the effluent is directed to the existing lift station, where centrifugal pumps send the effluent to the new treatment system.
- Effluent pH is adjusted using the existing control system, which consists of the addition of either carbon dioxide (CO_2) (high pH) or lime water (low pH) at the inlet of the pumps.
- In times of process upsets, spills or other unusual events, the effluent will be diverted to a new spill pond, which will be adjacent to the existing lift station:
  - Volume: 15,000 m^3;
  - Lined, earthern basin that would be built in the location of an existing, but decommissioned fuel tank: this tank would be demolished as part of the construction of the new spill pond.
- Diverted effluent would either be metered back into the effluent stream with dedicated pumps once it has been deemed safe to do so or treated and disposed of by other means, as required.

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Primary Clarification

- Primary clarification is the physical treatment process of removing solids before biological treatment.
  - Process water enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while settleable solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system.
  - Effluent destined for biological treatment leaves the clarifier over a weir.
- A new, 63m diameter, peripheral drive gravity clarifier will be installed west of the mill's main access road to remove the solids contained in the effluent prior to secondary treatment.
  - The clarified effluent is collected in a standpipe and sent, via a new lift station, to a new cooling system.
  - Solids will be collected at the bottom of the clarifier and sent to a new sludge dewatering facility.
- This process uses the same principles as the current method of effluent clarification (settling basins), except that it does it more efficiently, in less time and virtually eliminates the risk of odour generation from the potential decomposition of solids in a settling basin.

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Effluent Cooling

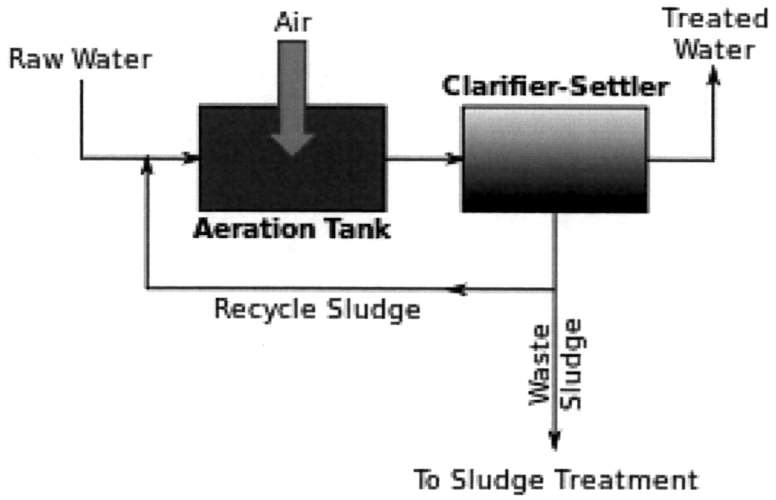
- After primary clarification, the effluent will be cooled, using an indirect cooling loop, prior to aerobic treatment;
- This cooling is necessary to ensure proper treatment:
  - Effluent temperature is approximately 48°C while treatment temperatures is required to be around 37 °C;
- A system of heat exchangers will be used for this cooling, using fresh water as the cooling medium;
- The cooled effluent will be directed, by gravity, to the secondary treatment system while the heated fresh water will be sent to a series of direct cooling towers, which will dissipate the heat of the effluent in the air:
  - Once "free" of this heat, the fresh water will be reused for cooling and in the mill processes.

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Activated Sludge Treatment (AST)

- Activated sludge treatment is a biological wastewater treatment process widely used for the secondary treatment of both domestic and industrial wastewater, particularly waste streams high in organic or biodegradable content.
- Activated sludge is a term used to describe the microbe-rich deposits in settling tanks and basins that are gradually added to incoming wastewater in a treatment facility. The resulting mixture is aerated so the microorganisms can decompose any organic materials into water, carbon dioxide, and other compounds. After decomposition, any debris remaining can easily settle in the water.



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Aeration Basin

- The treatment system will consist of 2 circular aerated basin, each with a volume of 14,000 m^3, (45 m diameter x 9 m depth), providing approximately 9 hours of retention of effectively remove from 90 to 95% of the BOD contained in the effluent;
- Aeration will be provided by a series of subsurface mixer/aerators, which will keep the basins thoroughly mixed and provide the necessary oxygen to support the microbial degradation of BOD within the basin;
- This process is essentially the same as what is currently used at the mill (aerated stabilization basin), but is occurs at a much faster pace.

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Secondary Clarification

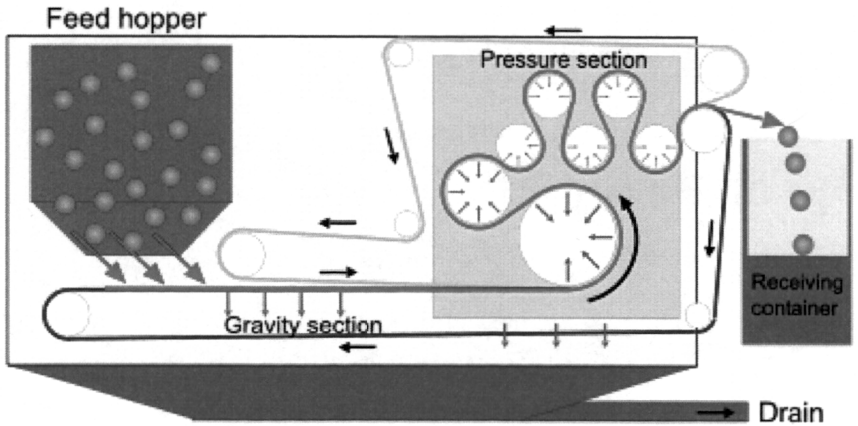
- Secondary clarification is essentially the same process as primary clarification, except that it removes the solids generated during biological treatment.
  - Treated effluent enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while settleable solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system.
- Two new, 63m diameter, peripheral drive gravity clarifiers will be installed east of the mill's main access road, and adjacent to the aeration tanks, to remove the solids contained in the treated effluent
  - The clarified, treated effluent is collected in a standpipe and sent, via a new lift station, to the new marine outfall.
  - Solids will be collected at the bottom of the clarifier and sent to a new sludge dewatering facility.
- This process occurs unassisted in the existing wastewater treatment system.

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Sludge Dewatering

- The sludges generated during primary and secondary treatment are blended and thickened using two distinct processes:
  - Gravity dewatering table: this pre-thickening step is required to reduce the quantity of free-standing water and facilitates the overall dewatering process;
  - Belt press: a **belt filter** is used for solid/liquid separation processes, where the process of filtration is primarily obtained by passing a pair of filtering cloths and belts through a system of rollers. The system takes a sludge or slurry as a feed, and separates it into a filtrate and a solid cake.
  - Two belt presses will be used to dewater the sludge generated in the process
  - Dewatered sludge will be sent to various disposal methods, ranging from landfill to combustion in the mill's existing bark boiler to agricultural uses (soil amendment, fertilizer, etc.)



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Effluent Discharge

- The treated effluent will be directed, by gravity, to a new pumping station, where it will be pressurized and sent through a new, submerged marine outfall for final discharge into Northumberland Strait.
- This outfall, made of high density polyethylene (HDPE) pipe, will be laid down at the bottom of Pictou Harbour and equipped with a diffuser system that will ensure adequate dispersion of the effluent at the point of discharge, thereby causing minimal effect on the receiving water and its contents.
- The exact location and routing of this outfall will be determined using 2 D and 3D modeling of Pictou Harbour.

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Receiving Water Study and Outfall Routing

- The key objective of the receiving water study is to determine the optimum location for the new mill outfall discharge among four possible discharge points:
  - Approximately 500 m from the Causeway Outlet;
    - This point was dismissed quickly, as it offers no dispersion potential
  - Between 1 and 2 km past the mill towards the centre of Pictou Harbour;
  - Approximately 6 km from the mill at Lighthouse Point; and
  - Approximately 9 km from the mill at the edge of Northumberland Strait.

- Points were selected in consideration of the following issues:
  - Fisheries;
  - Birds and other wildlife;
  - Social sensitivities; and
  - Constructability.

- It is possible that alternate discharge locations may be proposed, based on the results of the study and discussions with vendors on possible treatment plant performance levels;

- Model built with Boat Harbour basin in its future state (tidal).

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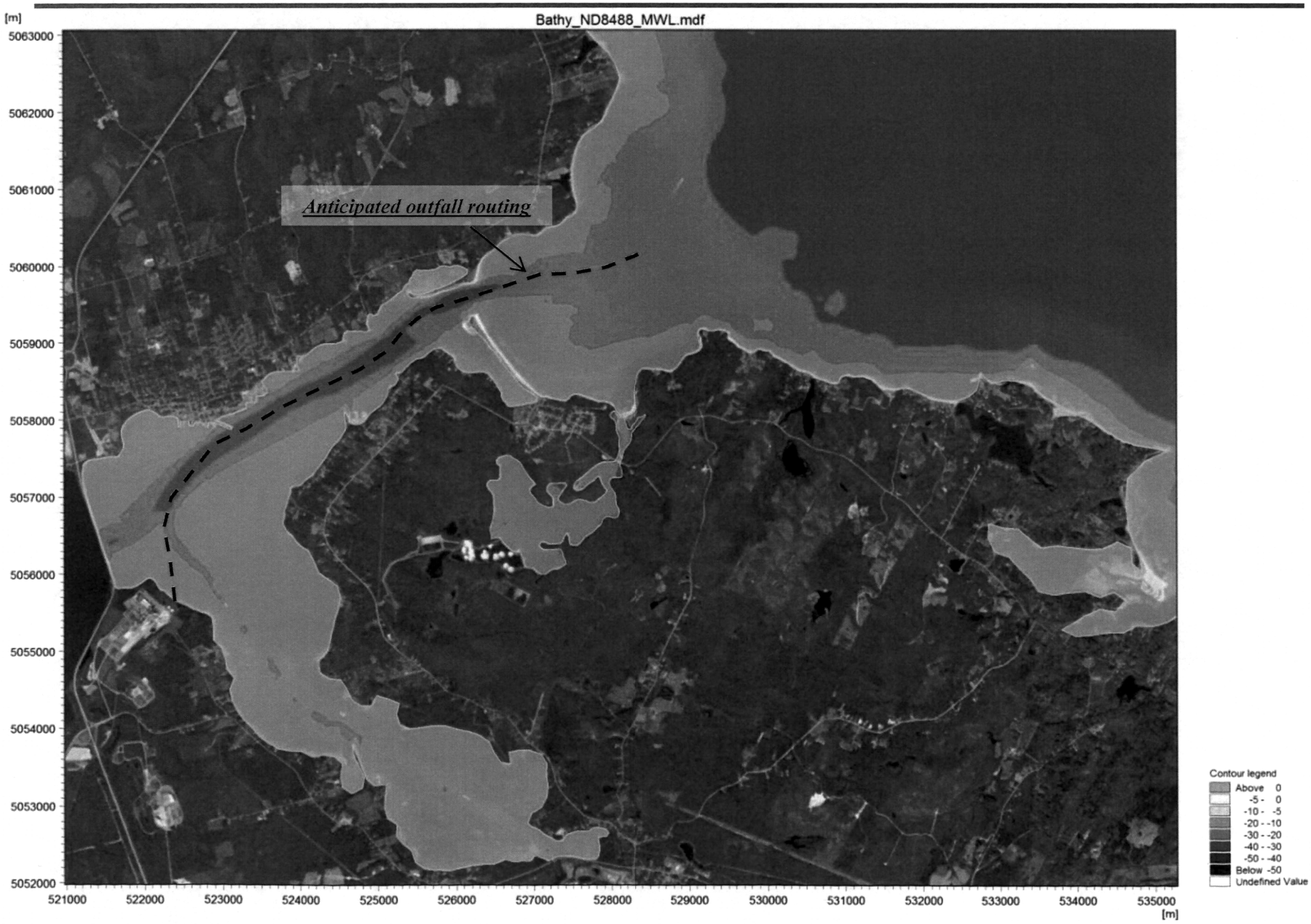
Tasks Involved in Receiving Water Study

- Background review and data collection of relevant information:
  - This task will include determination of regulatory guidelines and criteria for marine waste water discharge.
    - Bathymetry, water levels and currents, wind records, ambient water quality, effluent discharge, regulatory guidelines
- Far-field hydrodynamic and water quality modelling using the MIKE21 Coupled Model.
  - This task will include identification of the dispersion extent of discharged waste water and recommendation for the outfall end-of-pipe location.
- Near-field mixing modelling of effluent characteristics and estimating the size of the initial mixing zone using a CORMIX model.
  - Results will be compared to federal and provincial water quality guidelines for protection of marine aquatic life.
  - This task will include identification of outfall diffuser configurations that will suit the effluent dispersion characteristics, through testing of several outfall locations and configurations to determine the preferred alternative based on computed dilution factor at the limit of the regulatory mixing zone (RMZ).
- Assessment of environmental effects of the effluent discharge on the receiving environment in the far- field and near-field areas of Pictou Harbour.
- Evaluation of impact of flow and organic loading changes in treated effluent quality on dispersion modeling results.

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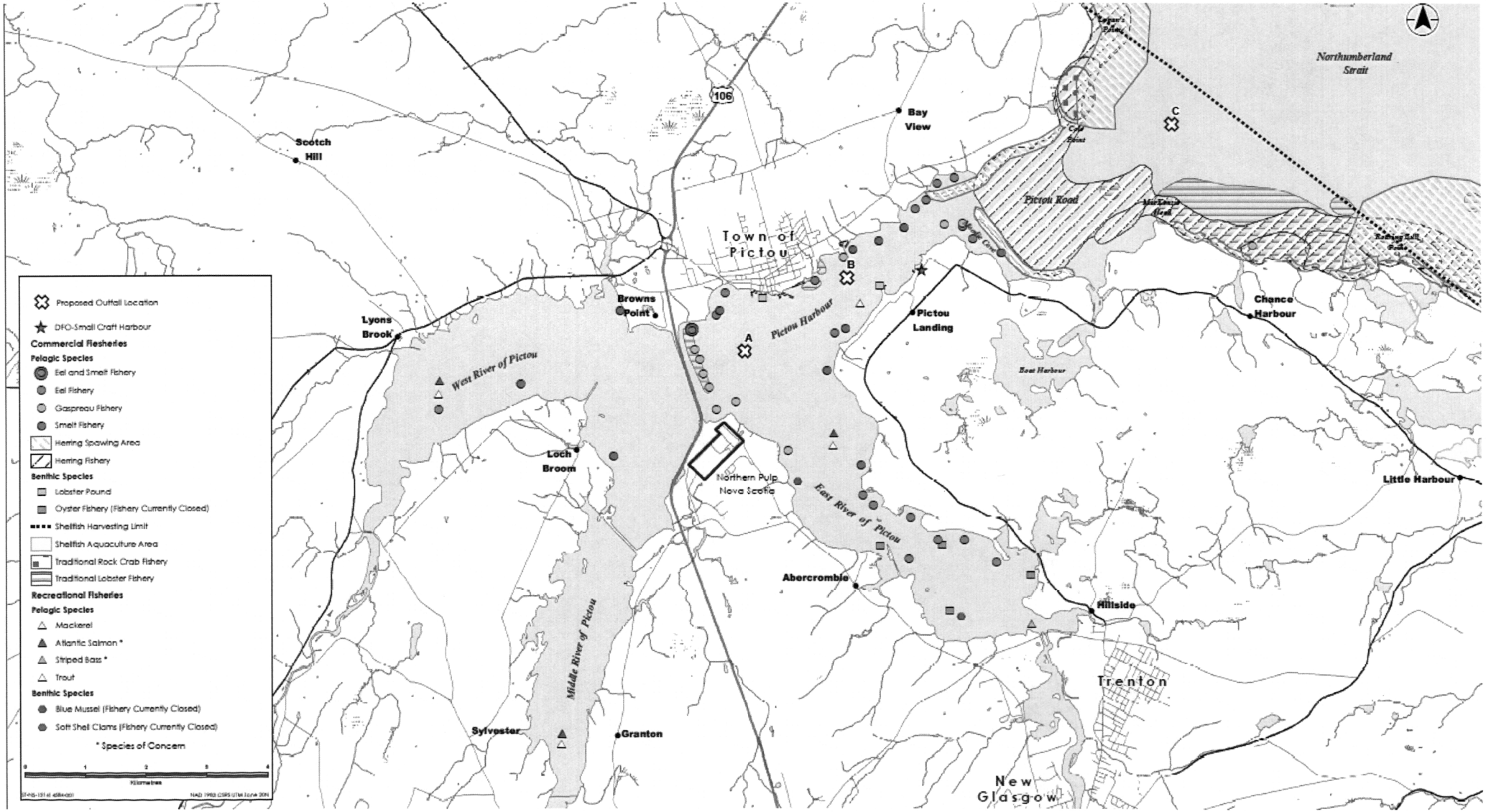
Depth Profile, Pictou Harbour



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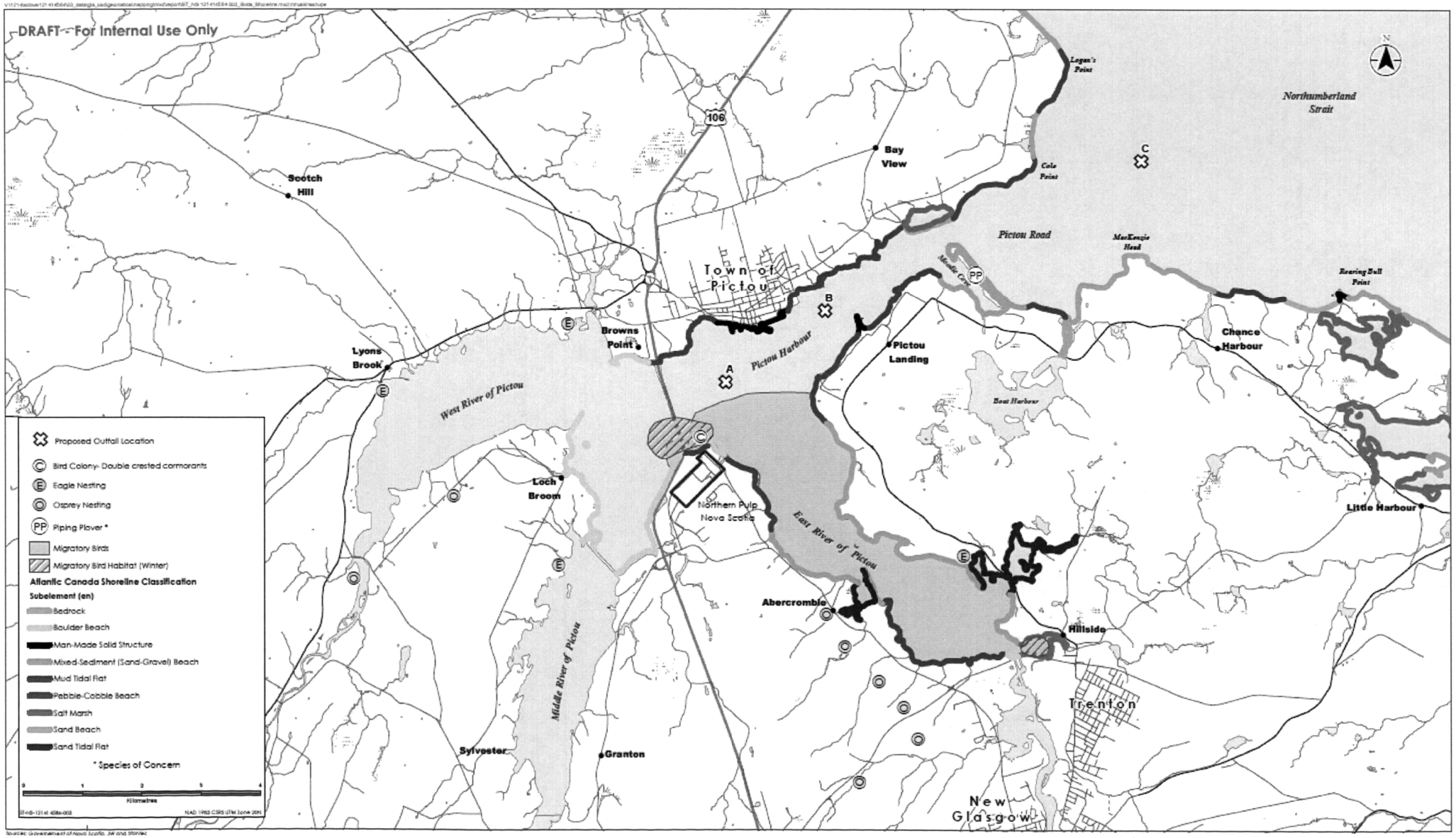
Considerations Taken to Locate Discharge Points
Fisheries



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Considerations Taken to Locate Discharge Points
Birds and Shoreline

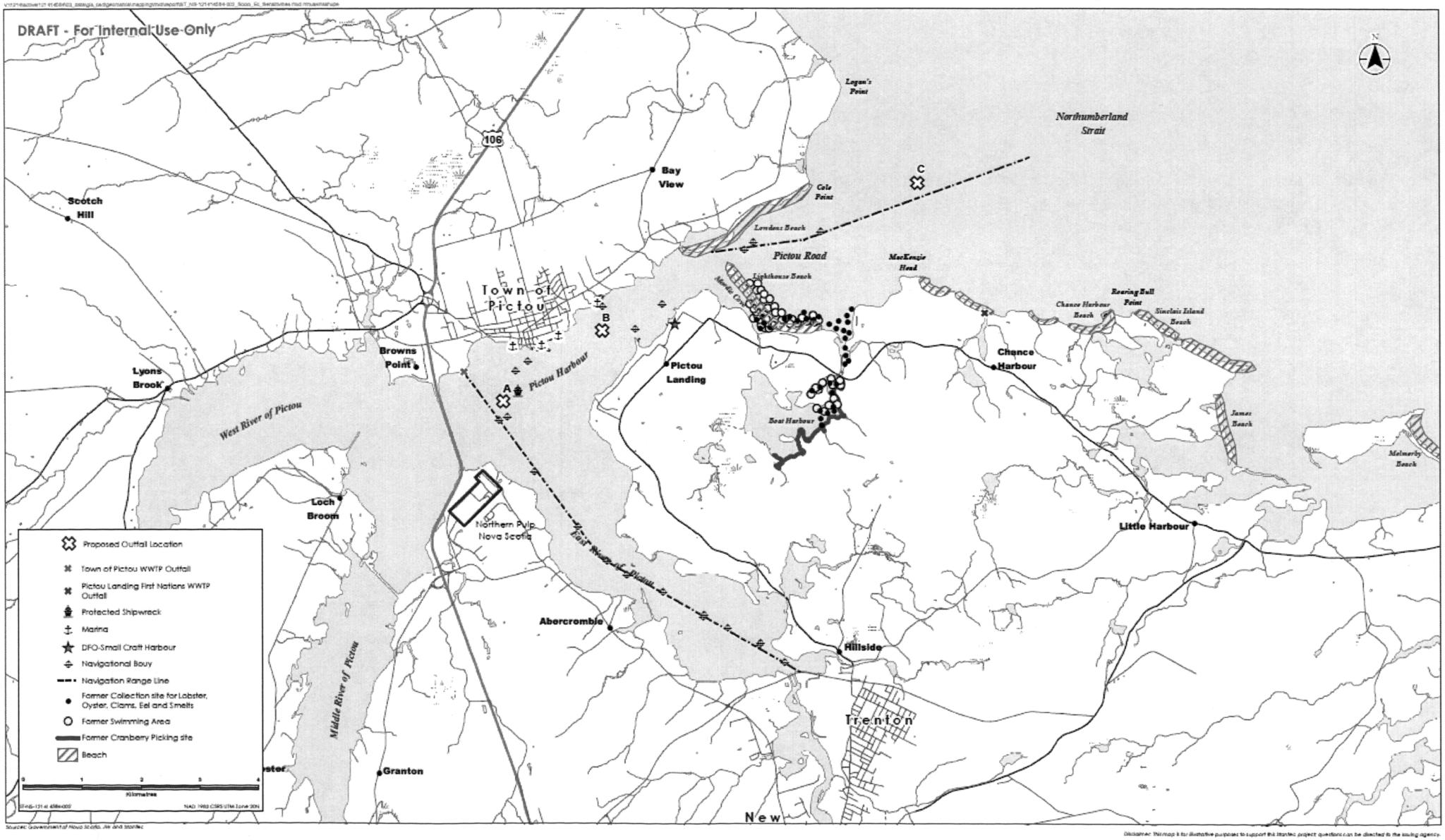


Bird and Shoreline Sensitivities

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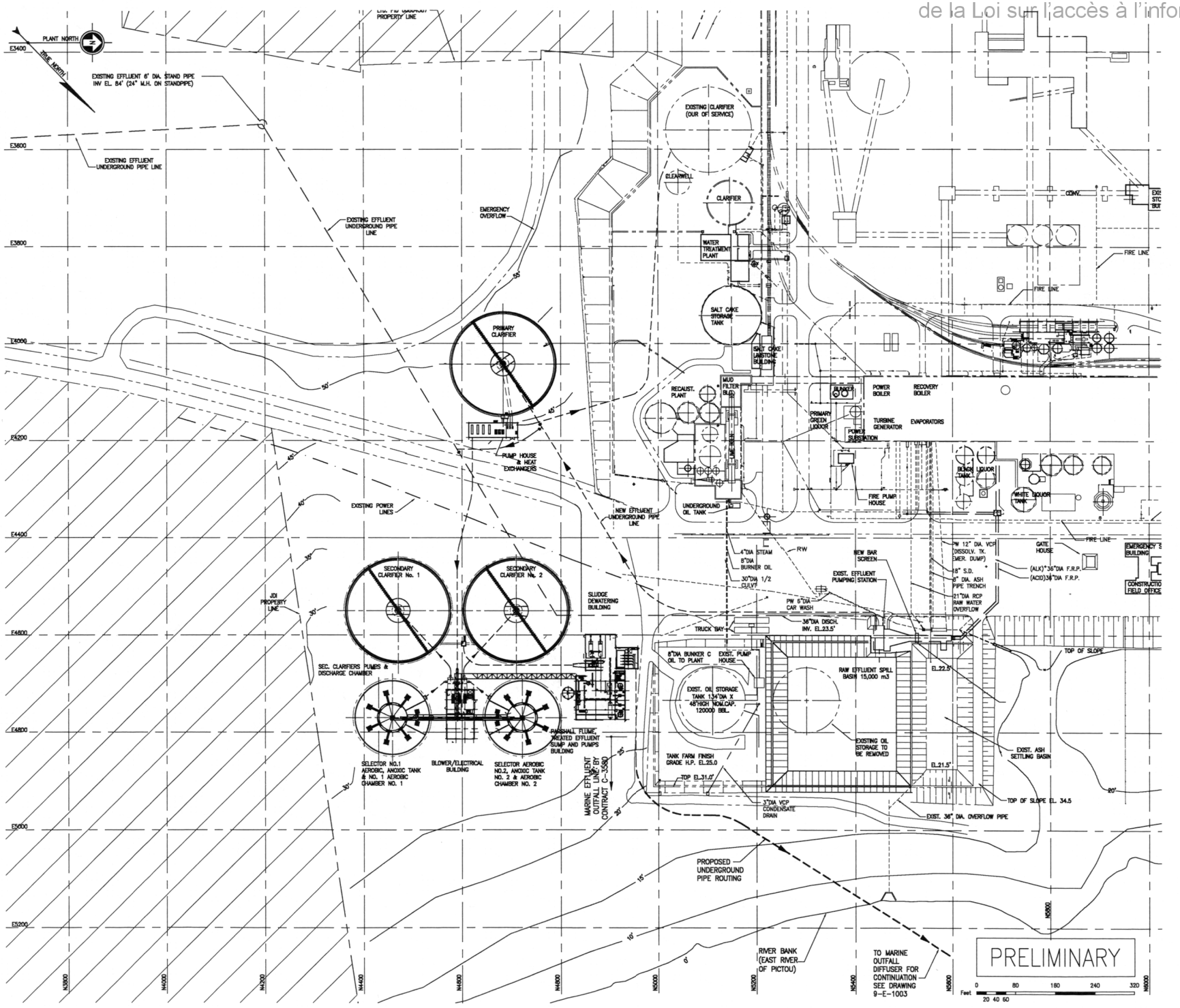
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Considerations Taken to Locate Discharge Points
Socio-economic Sensitivities



Other Socioeconomic Sensitivities

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REV.	DRAWING NUMBER	REFERENCES

C	LKM 2017/04/26	FOR BID WITH CONTRACT C-3580
B	LKM 2017/04/12	FOR CLIENT'S COMMENTS
A	EF 2017/02/28	ISSUED FOR INFORMATION
REV	APPROVAL DATE	ISSUE STATUS

CERTIFIED FOR CONSTRUCTION
REV.: DATE:

APPROVAL
SIGNATURE DATE

SCALE: 1/64"=1'-0"
DESIGNED: EF DATE: MAR 2017
DRAWN: DAF DATE: MAR 2017
CHECKED: DATE:

KSH
KSH Solutions Inc. Montreal, Canada

NORTHERN PULP NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

EFFLUENT TREATMENT PLANT REPLACEMENT

EFFLUENT TREATMENT PLANT SITE LOCATION

PROJECT	DRAWING NUMBER	PAGE	REV.
11-1112A	9-E-1001		C

CLIENT NUMBER:

000063

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4.0 ENGINEERING CONSIDERATIONS FOR EFFLUENT PIPELINE AND DIFFUSER

Stantec civil engineers have determined that the selection of the preferred outfall option (i.e., the Alt-C discharge location in Northumberland Strait) and for the effluent pipeline will require geotechnical information related to existing harbour soils, civil engineering related to hydraulics and conveyance of the wastewater treatment plant effluent flows to the point of discharge, and marine civil engineering support in the identification of measures to be employed for pipe stabilization. The latter would include bedding and anchoring systems, and for pipe protection from ice, waves and vessel navigation. The following sections provide a preliminary and brief description of the engineering considerations and methodology that could be undertaken for the potential implementation of the Alt-C outfall option based on the effluent plume modelling and receiving water study results.

4.1 OUTFALL PIPE HYDRAULICS

The sizing of the outfall pipe is dependent on many variables including length of pipe, pipe wall friction, hydraulic head at discharge, inlet pressure and other factors. The following was considered in the preliminary calculations in determining the expected nominal pipe diameter required in Pictou Harbour to convey the plant effluent away from the shoreline:

- The outfall pipe will be approximately 9 km in length from the pumping source at the mill to the discharge diffuser at the Alt-C location in Northumberland Strait.
- The pipe will be of high density polyethylene (HDPE) fabrication and fused on site to create suitable lengths for installation.
- Pipe lengths will be joined by couplings underwater, with no losses associated with the joints.
- The mean water level at the proposed diffuser location indicates that the discharge end of the pipe will be in approximately 10 m of water.
- High tide and storm surge conditions will add an additional maximum 3.5 m of head on the discharge diffuser.
- The maximum effluent daily flow from the pumping station is expected to be 0.984 m^3/s.
- The pipe diameter and flow conditions shall maintain a minimum cleansing velocity of 0.6 m/s within the outfall pipe length.

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In addition to these physical hydraulic conditions considered, the design and selection of the pipe diameter shall consider that:

- HDPE piping has flexibility over long distances to bend, and as such it is not expected that mechanical or significant bends in the pipe will be required over the approximate 9-km length.
- Depending on the depth of the pumping station, bends may be required at the pumping station where the pipe enters Pictou Harbour.
- Proposed diffusers will consider ports that are placed on the upper side of the pipe and extend beyond the rock cover depth.
- Outfall pipe will sit on a rock mattress which follows the undulating ocean bottom profile.
- Effluent from the new wastewater treatment facility will require pumping.

The suggested pipeline routing in Pictou Harbour from the mill to the proposed outfall location beyond Pictou Road in Northumberland Strait was considered on the basis of minimizing pipe bend and reducing potential interactions with environmental and socio-economic sensitivities, particularly achieving sufficient water depth, were possible, to minimize interference with navigation and/or potential ice keels. ***Figures 4-1*** to ***4-3*** present the environmental and socio-economic considerations with the conceptual pipeline route proposed to the Alt-C outfall location.

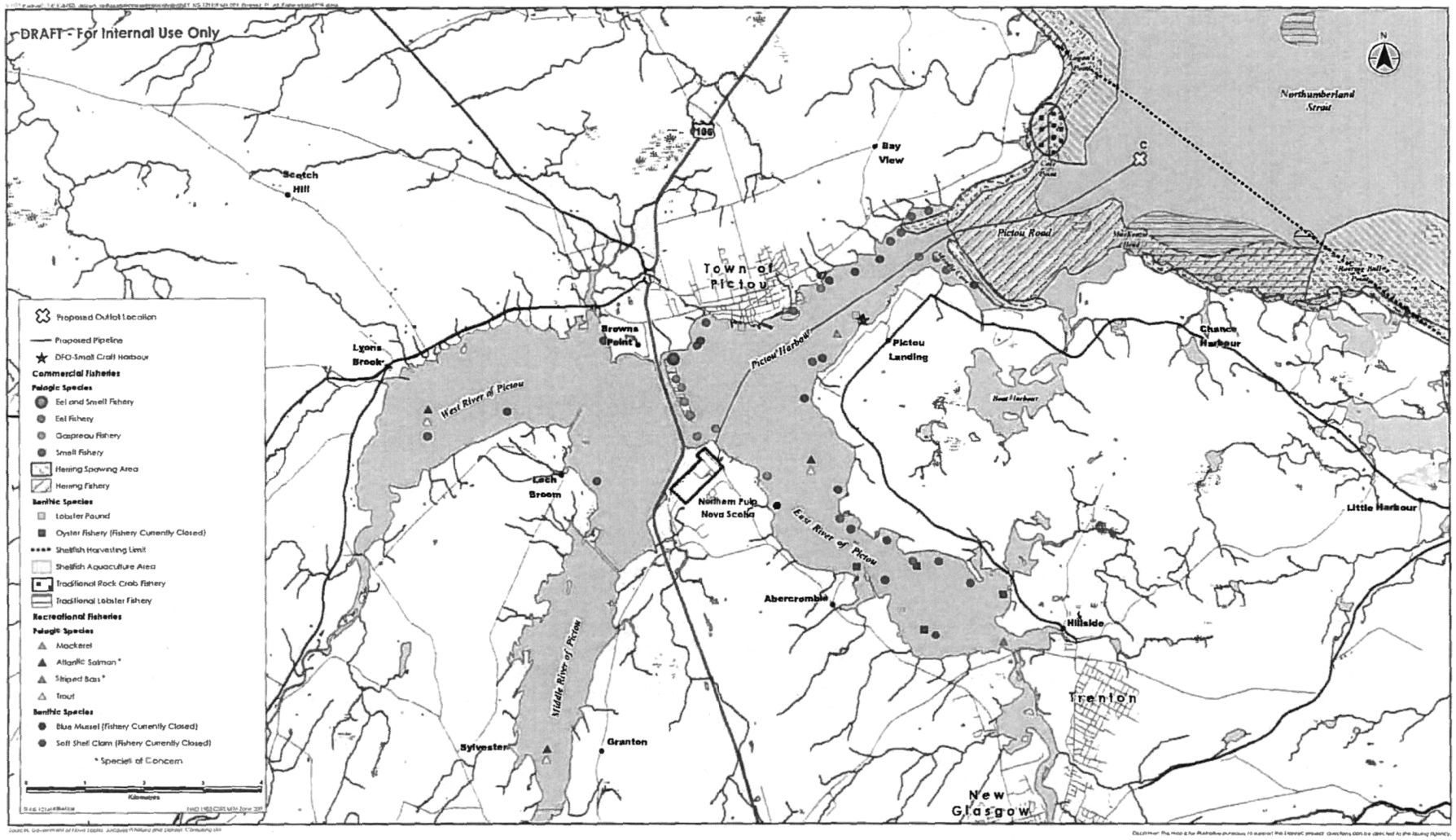
4.1.1 Preliminary Sizing Estimates

Preliminary calculations have considered the application of the Hazen Williams Equation for pressure pipe to determine pipe diameter, using the Bentley FlowMaster V8i computer software program. The equation considers the above-referenced conditions with an estimated elevation for the pumping station to be at 7.6 m above sea level (KSH, pers. comm. 2017). ***Figure 4-4*** indicates that a pipe size of 950 mm in diameter will be adequate to convey a flow rate of 0.984 m^3/s over a distance of 9 km with 10 m of head at the inlet end. This equates to a pipe slightly larger than 36 inches in diameter. At this stage in the design process the following is known:

- The outfall pipe will be between 36" to 42" in diameter (based on the difference in elevation between land at 7.62 m and the head at the discharge point at 9 km of minus (-) 10 m.
- Preliminary estimate of 20 m of head at pipe inlet could be adequate for the above pipe diameter and elevation difference indicated.

If the mill's wastewater plant is situated at an elevation of approximately 7.6 m above sea level and it is to discharge under gravity conditions alone, a pipe diameter of 1250 mm would be required (refer to ***Figure 4-4***). This equates to a pipe slightly larger than 48 inches in diameter.

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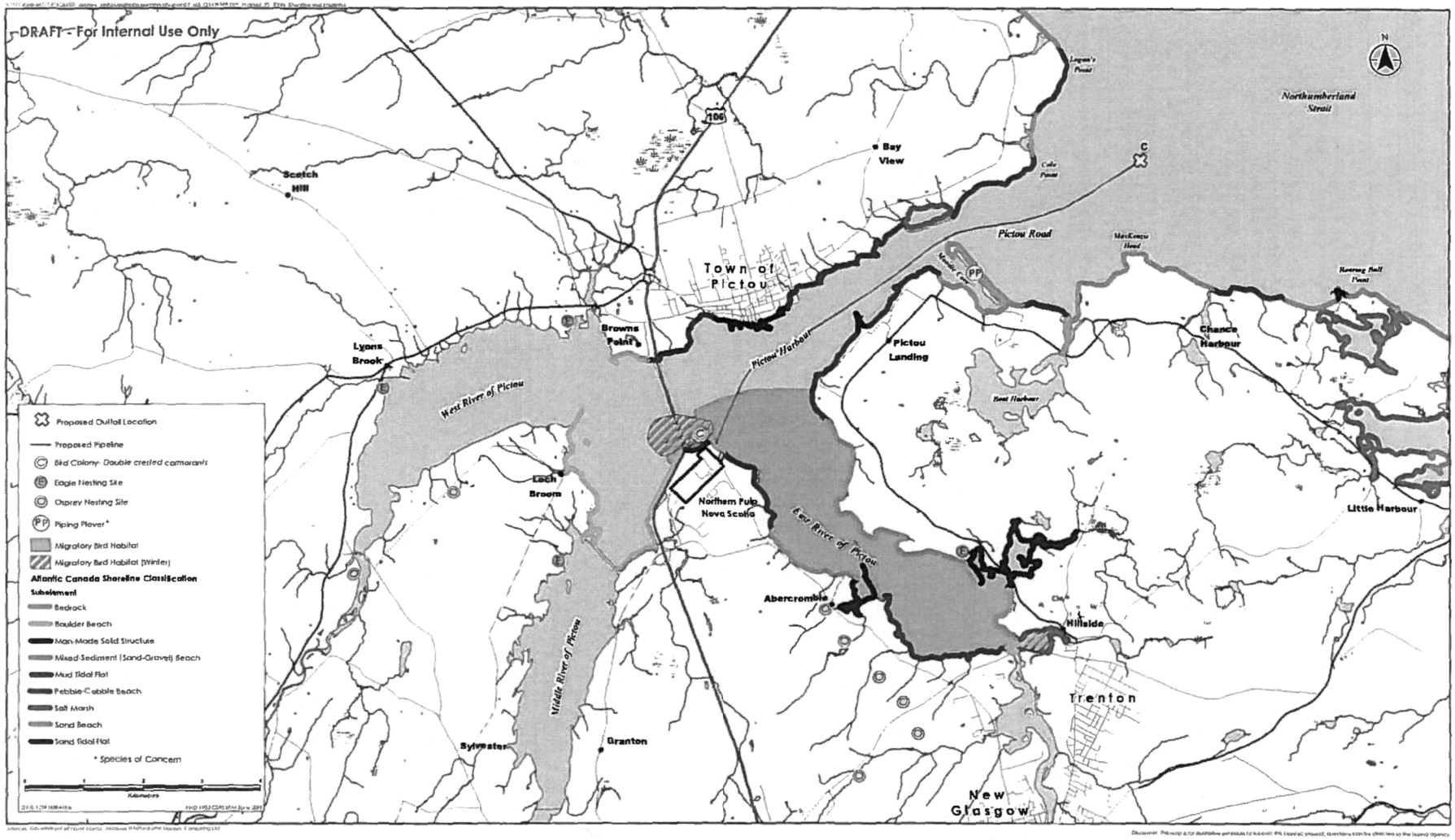
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PRELIMINARY RECEIVING WATER STUDY – PICTOU HARBOUR NOVA SCOTIA

Proposed Pipeline Route and Commercial, Recreational, and Aboriginal Fishery Sensitivities in Pictou Harbour and Surrounding Areas

Figure 4-1

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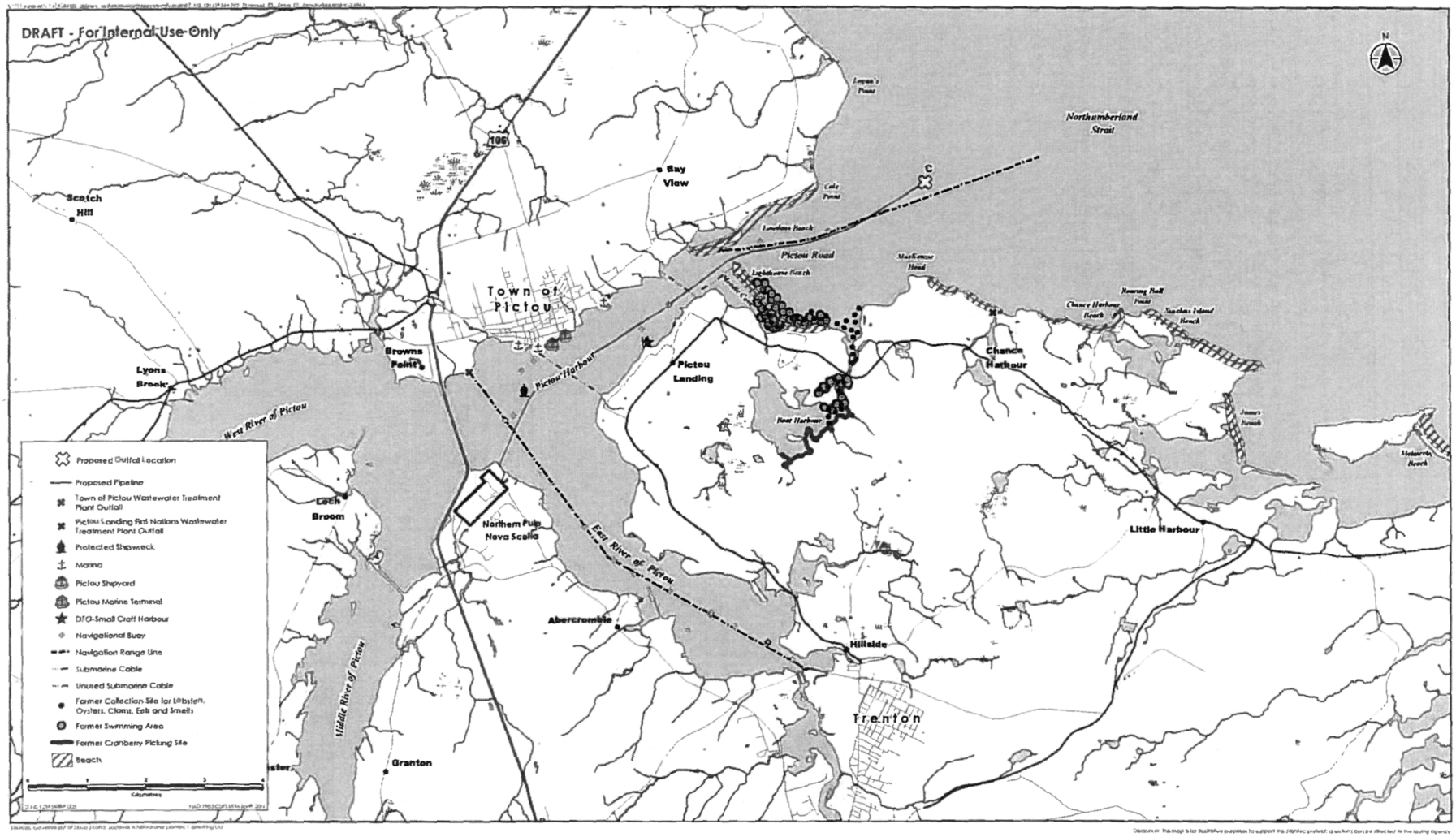
Proposed Pipeline Route and Bird and Shoreline Sensitivities in Pictou Harbour and Surrounding Areas

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PRELIMINARY RECEIVING WATER STUDY – PICTOU HARBOUR NOVA SCOTIA

Figure 4-2

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Proposed Pipeline Route and Socio-economic Sensitivities in Pictou Harbour and Surrounding Areas

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PRELIMINARY RECEIVING WATER STUDY – PICTOU HARBOUR, NOVA SCOTIA

Figure 4-3

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KSH Effluent Outfall - Pressure Pipe

Project Description

Friction Method	Hazen-Williams Formula
Solve For	Pipe Diameter

Input Data

Pressure 1	10.00	m H2O
Pressure 2	13.50	m H2O
Elevation 1	7.62	m
Elevation 2	-10.00	m
Length	9000.00	m
Roughness Coefficient	130.000	
Discharge	0.98	m³/s

Rating Curve Plot

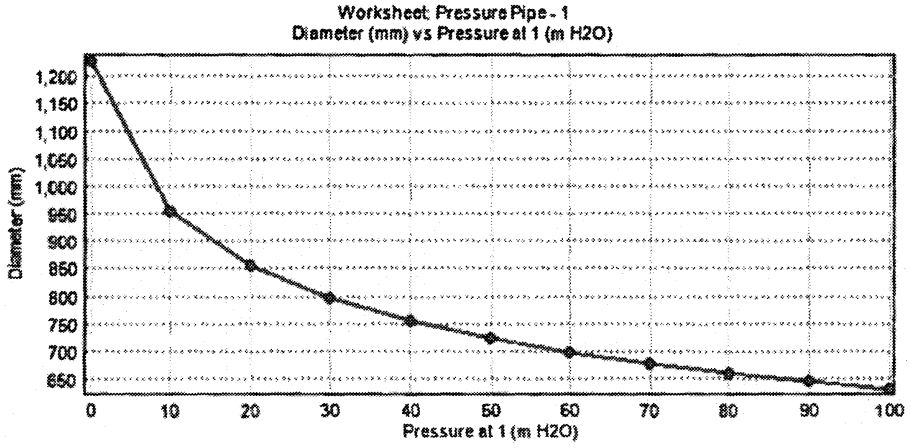


Figure 4-4 Determination of Effluent Pipe Diameter Using the Hazen Williams Equation

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4.2 MARINE CIVIL ENGINEERING

This section provides some considerations for the various marine civil engineering aspects that could affect the design and construction of the marine outfall including: climactic conditions (wind, waves, currents, ice, sea level rise), bathymetry, physical constraints, sub-surface conditions, and pipeline construction.

4.2.1 Climactic Conditions

Although an assessment of the metocean and climactic conditions are beyond the scope of this preliminary assignment as it applies to the pipeline, below are some general considerations on climate with some anecdotal information provided.

Information on wind climate is provided in Section 2.2.1.4. The predominant wind during winter months is NW to WNW which will influence wind-generated waves in Northumberland Strait during winter months when ice is not present. The presence of ice in winter will not result in the formation of waves. The prevailing winds in the summer are from the SSE to ESE, which will have an effect on wind-generated waves in Pictou Harbour.

There is no readily available information on wave heights for the study area; however, information contained in Owens and Bowen (1977) for the Southern Gulf of St. Lawrence area is provided in ***Table 4-1***.

Table 4-1 Seasonal and Annual Significant Wave Heights for the Southern Gulf of St. Lawrence

Median Significant Wave Height (m) in Southern Gulf of St. Lawrence					
General Location	**June - Mid-September**	**Mid-September to October**	**November - December**	**Annual**	**Expected Significant Wave Height Once / year**
NW PEI	0.6	1.0	1.1	0.9	5.5
NE PEI	0.8	1.0	1.3	0.9	5.8
Cape Breton	1.2	1.7	3.2	1.4	7.6

There is some shielding of winds and reduced fetch from Prince Edward Island and therefore smaller waves are anticipated on the Nova Scotia shore of Northumberland Strait in the Pictou area. Significant waves are still possible and there have been occasions when the Nova Scotia – PEI Ferry has been taken out of services because of wind and waves attributed to storms (e.g., http://www.huffingtonpost.ca/2011/10/05/ferries-cancelled-as-mari_n_995672.html).

Anecdotal evidence suggests that wave heights in Pictou Harbour can be in the order of 0.6 m with significant winds out of the southeast.

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The currents in the study area are described in Sections 2.2.15 and 3.1.2.1. Although there is a general current in the Gulf of St. Lawrence from west to east, the magnitude is small and considered to be negligible at somewhere in the range of 0.06 to 0.11 m/s per day (CCG, 2012).

There is much written lately about sea level rise, resulting from the combined effect of an increased global mean sea level and the additional effect of regional subsidence of the Earth's crust, or glacial isostatic adjustment. According to information presented in the Province of Nova Scotia's 2009 *State of Nova Scotia's Coast: Technical Report* there are several numerical models regarding this subject. But it is noted in this report that a global mean sea level rise of up to 1.2 m for a strong warming scenario should not be ruled out.

Storm surge should also be acknowledged for pipe planning purposes and a minimum storm surge of 1.0 m should be considered.

4.2.2 Ice

The general information provided below was obtained from the Canadian Coast Guard on Ice Climatology and Environmental Conditions (CCG, 2012). Generally, or normally, the first ice formation in the Gulf of St. Lawrence occurs in the St. Lawrence River in early to mid-December and progressively moves to Saguenay River and then forms along the coast of New Brunswick and progressively moves eastward. In January, the ice concentrations have reached very close pack range in the Northumberland Strait. By the end of February, thin first-year ice may be found in Northumberland Strait. It is emphasized, however, that ice conditions in the Northumberland Strait are highly variable and the ice cover varies considerably from year-to-year. There have been years when the entire Strait is frozen and totally ice-covered, while other years the Strait is relatively ice-free.

It is quite possible for drift ice to be blown into the shore with winds out of the north. There is also the possibility of some ice-rafting along Nova Scotia's Northumberland shore where ice sheets over-ride each other and stack-up along the shore.

Fast ice (ice which forms and remains fast along the coast) for most coastal regions in the Gulf has limited extents as it forms in smaller bays and inlets which might be more typical and expected in Pictou Harbour (ENSR 1999).

The 1999 ENSR report included a review of available ice data for the Pictou area including consultation with researchers and review of published literature. It was determined that quantitative data in Pictou Road and Pictou Harbour was unavailable, while ice in the Northumberland Strait has been measured and studied extensively. Of particular interest were the events of ice scouring as it is well known that pipelines, outfalls, diffusers, and submarine cables are at risk during ice scour events.

It was reported (in ENSR, 1999) that Maritime Tel and Tel (MT&T) performed an ice evaluation in support of an optical communication cable deployment across the Northumberland Strait.

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Based on MT&T's review, the estimated potential for damage to the cable from ice scour extended to water depths of 12 to 14 m. In 1991 their cable was trenched and buried to a selected depth (depth is unknown) and left on the surface of the sea bottom at greater depths. Unfortunately, the winter of 1991/1992 was severe and the cable was severed by ice keels at a water depth greater than 18 m towards the Woods Island, PEI side of Northumberland Strait.

Based on the above, substantial ice pile-up should be expected near shore of Northumberland Strait and ice scour is possible and should be anticipated anywhere in Pictou Road and the Northumberland Strait area. Although available information suggests that there is a potential for damage to the pipe, outfall, and diffusers in the areas of Pictou Road out into Northumberland Strait, based on ENSR (1999) it appears unlikely that ice scour would occur in Pictou Harbour.

4.2.3 Bathymetry

Bathymetric information is provided in ***Figure 2-14***, showing the general shape of the bottom topography and water depths in metres referenced to Mean Water Level. A main channel is present along the longitudinal axis of Pictou Harbour that is generally 10 m in depth or greater in some areas. This channel decreases in depth to between 7.5 to 10 m in Pictou Road before the depths gradually increase in Northumberland Strait and at the proposed Alt-C outfall location.

4.2.4 Physical Constraints

There are several physical constraints that may interact with the outfall pipe and which have been presented on ***Figure 4-3*** and described in general as socio-economic sensitivities in this report (e.g., Section 4.1). These include physical constraints such as submarine cables, navigation buoys and a sunken relic which could impact the final routing of the outfall pipe.

4.2.5 Subsurface Conditions

4.2.5.1 General Surficial Geology and Sub-Surface Conditions

The characteristics of the Southern Gulf of St. Lawrence has been described by Owens and Bowen (977) as:

a. Geological character - Predominantly un-resistant carboniferous sedimentary rocks with metasediments overlain by thin till deposits;

b. Backshore relief – Low, unrestrained cliffs (3 – 10 m);

c. Beach character – Great variety, ranging from barrier islands to multiple intertidal bars and narrow beaches;

d. Fetch and wave exposure - Generally less than 50 km; however, the area is somewhat sheltered from waves out of the northwest by Prince Edward Island. Also, when ice is present along the coast there is some protection to the Nova Scotia coastline from winter onshore winds;

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e. Ice climate - 7 to 8 months ice-free season;

f. Mean tidal range - 1 to 2 m; and

g. Coastal erosion - Generally, in the order of 1 to 2 m per annum.

4.2.5.2 Site-Specific Information

Stantec has completed nearshore marine geotechnical investigations in the general vicinity of this pipeline in Pictou Harbour for various other clients. Based on the findings of these previous investigations, the thickness of soft compressible marine sediments ranges from 7 to 15 m. Beneath the marine sediments, a relatively thin layer of glacial till was encountered overlying mudstone or sandstone bedrock.

In addition, Stantec has reviewed the historical geotechnical information from 1965 that was provided by KSH (pers. comm. 2017). This information included both land and marine boreholes which encountered similar conditions to the boreholes Stantec has drilled in the area. It should be noted that the thickness of marine sediments encountered in the historical boreholes may have significantly changed due to natural currents and the construction of the adjacent causeway which was completed in 1968.

4.2.5.3 Geotechnical Considerations

The likely existence of the soft layer of marine sediments along the proposed outfall route will create a challenge for design and construction as it is anticipated that significant amounts of total and differential settlement and resulting pipe stresses will be experienced when a load is applied to this material.

To determine the properties of the marine sediments that will be encountered along the proposed outfall pipe alignment, it is recommended that a geophysical survey complimented with a marine geotechnical investigation be completed to determine the thickness of the marine sediments, time rates for consolidation to provide settlement estimates, and to obtain strength parameters of the marine sediment material.

4.2.6 Construction

4.2.6.1 Pipe material

It is anticipated that the pipe for the outfall and diffuser will be high density polyethylene (HDPE) pressure class pipe to ASTM, AWWA and CSA Standards. The pipe is resistant to both internal and external chemical attack and is highly suited for conveying fluids of lower temperature (i.e., < 60°C). HDPE pipe does not degrade when exposed to ultraviolet light.

For long outfalls and diffusers, the pipe is typically assembled by joining individual lengths of pipe by either butt fusion welding or by joining with factory-made flanged joints. A long site next to

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the water's edge is desired for the outfall pipe fabrication and assembly yard. The pipe is then assembled on dry land to the required length and the ends are covered with blind flanges. As the fabricated pipe is launched into the water, concrete collars are added for ballast. The pipe, however, is very buoyant and does not sink with the concrete ballast. Riser pipes for the duckbill diffuser ports are added at the required locations. When the pipe is floating, and positioned over its final resting place, on the seafloor below, the pipe is slowly ballasted with sea water and the pipe gradually descends to the prepared rock mattress previously placed on the harbour bottom. A dive inspection would be conducted on the outfall pipe after it is positioned on the harbour bottom to ensure that the pipe is not damaged. Due to the excessive length of the pipeline of about 9 km to reach the Alt-C outfall location, the pipe may have to be fabricated and placed in manageable sections, say 1000 m long, and outfitted with bolted flanged connections and expansion joints.

4.2.6.2 Construction Approach

The actual assembly of the pipe is outlined above. The placement of the pipe would generally be as described below.

Near Shore Zone

The pipe installation in the Pictou Harbour near-shore zone to the mill would be installed in a pre-excavated trench, buried, and protected with armourstone. The armourstone would extend up the shore to a height that is sufficient to protect the pipe considering:

- High water level
- Storm surge
- Sea level rise
- Wave height
- Wave run-up.

For preliminary planning purposes, the armourstone would extend up the shore zone to about Elevation +4 m to +5 m above Chart Datum. The lower extents of the armourstone protection should extend into the near shore zone down to about Elevation -3.0 m Chart Datum.

The installation may require a temporary causeway as the water depth will likely be too shallow and insufficient for marine plant. The construction technique used for the 2009 East River crossing of the mill's effluent replacement pipe to Boat Harbour as depicted in ***Figures 4-5*** and **4-6** is a suitable example of the construction technique.

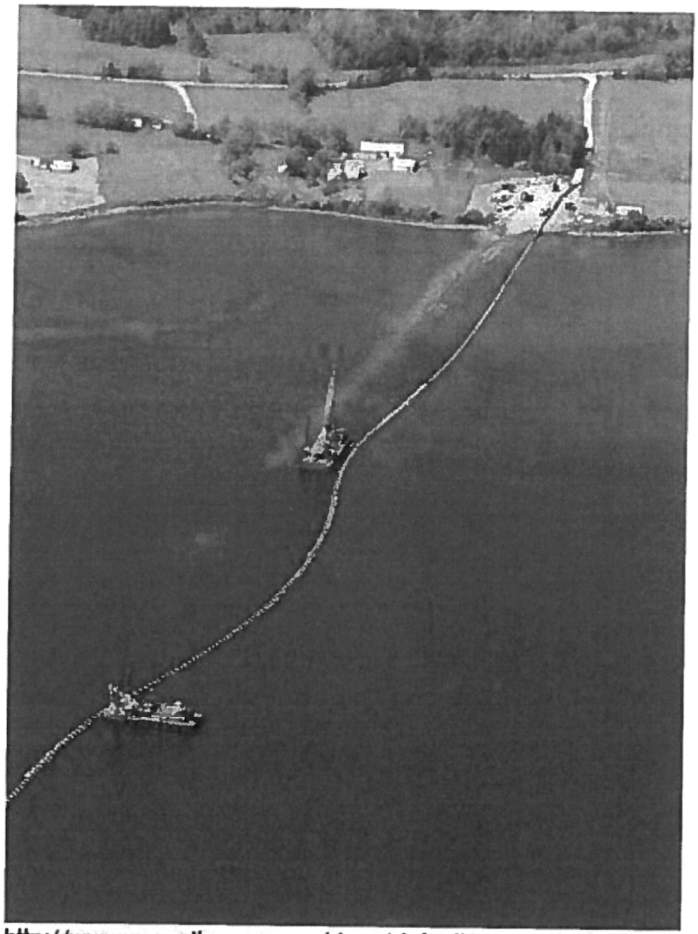
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Source: http://www.mcnallycorp.com/projects/projects-details/northern-pulp-river-crossing

Figure 4-5 East River Shore Construction of Mill's Effluent Pipeline Replacement in 2009

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Source: http://www.mcnallycorp.com/docs/default-source/Project-Specs/b70-northern-pulp-river-crossing-.pdf?sfvrsn=b17999df_2

Figure 4-6 Floating Effluent Pipeline on the East River in 2009

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Bottom Laid Pipe – Pictou Harbour

It is anticipated that there will be relatively deep marine sediment deposits on the harbour bottom and this will have to be examined in more detail in a site-specific sub-surface investigation. The pipeline construction may require the placement of a thick blasted and crushed rock mattress on the harbour bottom in order to partially consolidate the silts and to prepare the bottom to receive the new pipe. The pipe with concrete collars would rest on the mattress and then would be backfilled with a crushed rock backfill to totally cover the outfall pipe and to afford the pipe some protection against accidental impact from vessels and protection against inadvertent anchorage of vessels.

Trenched and Covered Pipe, Outfall, and Diffusers – Pictou Road to Northumberland Strait

It appears that the pipe, outfall, and diffusers would likely extend out into Northumberland Strait to a depth of approximately 10 m at the Alt-C location. The potential for ice scour and disturbance from waves should be investigated in more detail. As with the pipe in the near shore zone, it is recommended that a heavier armourstone be used from the main entrance of Pictou Harbour to the outer limits of the diffuser.

Diffuser ports should have riser pipe extensions to ensure that the discharge points are clearly above the top of the armourstone protection. Typically, the diffuser ports would be installed by divers after the stone protection is placed.

An access hatch should be provided at the end of the outfall pipe so that a remotely-operated vehicle (ROV) video inspection can be done after the protective rock layer is placed on the outfall pipe.

It is noted that the scour is possible and should be anticipated in Pictou Road and the Northumberland Strait and there is a potential for damage to the pipe, outfall, and diffusers. This requires further investigation.

4.3 SUMMARY AND CONCLUSION

Engineering considerations for the outfall pipe and diffuser were presented in this report. The selection of the preferred outfall option (i.e., the Alt-C discharge location in Northumberland Strait) and for the effluent pipeline will require geotechnical information related to existing harbour soils, civil engineering related to hydraulics and conveyance of the wastewater treatment plant effluent flows to the point of discharge, and marine civil engineering support in the identification of measures to be employed for pipe stabilizations.

A preliminary sizing of the outfall pipe was estimated to be between 36" to 42" in diameter. This was based on the difference in elevation between land at 7.62 m and the head at the discharge point at 9 km of 10 m below mean sea level. Other dependent variables considered

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in this sizing of the pipe included a maximum flow rate of 0.984 m^3/s conveyance over the distance of 9 km with 10 m of head at the inlet end, high tide and storm surge conditions that would add an additional 3.5 of head on the discharge diffuser, and the requirement to maintain a minimum cleansing velocity of 0.6 m/s within the outfall pipe length. Other factors to be considered included effluent pumping, placement of ports for the diffuser, and pipe bends and bedding on the seabed.

Marine civil engineering aspects considered that could affect the design and construction of the marine outfall included: climactic conditions (wind, waves, currents, ice, sea level rise), bathymetry, physical constraints, sub-surface conditions, and pipeline construction. It was determined that substantial ice pile-up should be expected near shore of Northumberland Strait and ice scour is possible and should be anticipated anywhere in Pictou Road and the Northumberland Strait area. It appears unlikely, however, that ice scour would occur in Pictou Harbour. Physical constraints that may interact with the outfall pipe included submarine cables, navigation buoys and a sunken relic in Pictou Harbour which could impact the final routing of the outfall pipe.

Site-specific nearshore marine geotechnical investigations in the general vicinity of the proposed pipeline in Pictou Harbour suggest the thickness of soft compressible marine sediments are in the order of 7 to 15 m. The likely existence of this soft layer of marine sediments along the proposed outfall route will create a challenge for design and construction as it is anticipated that significant amounts of total and differential settlement and resulting pipe stresses will be experienced when a load is applied to this material. It is recommended that a geophysical survey complimented with a marine geotechnical investigation be completed to determine the thickness of the marine sediments, time rates for consolidation to provide settlement estimates, and to obtain strength parameters of the marine sediment material. This will enable the determination of the properties of the marine sediments that will be encountered along the proposed outfall pipe alignment.

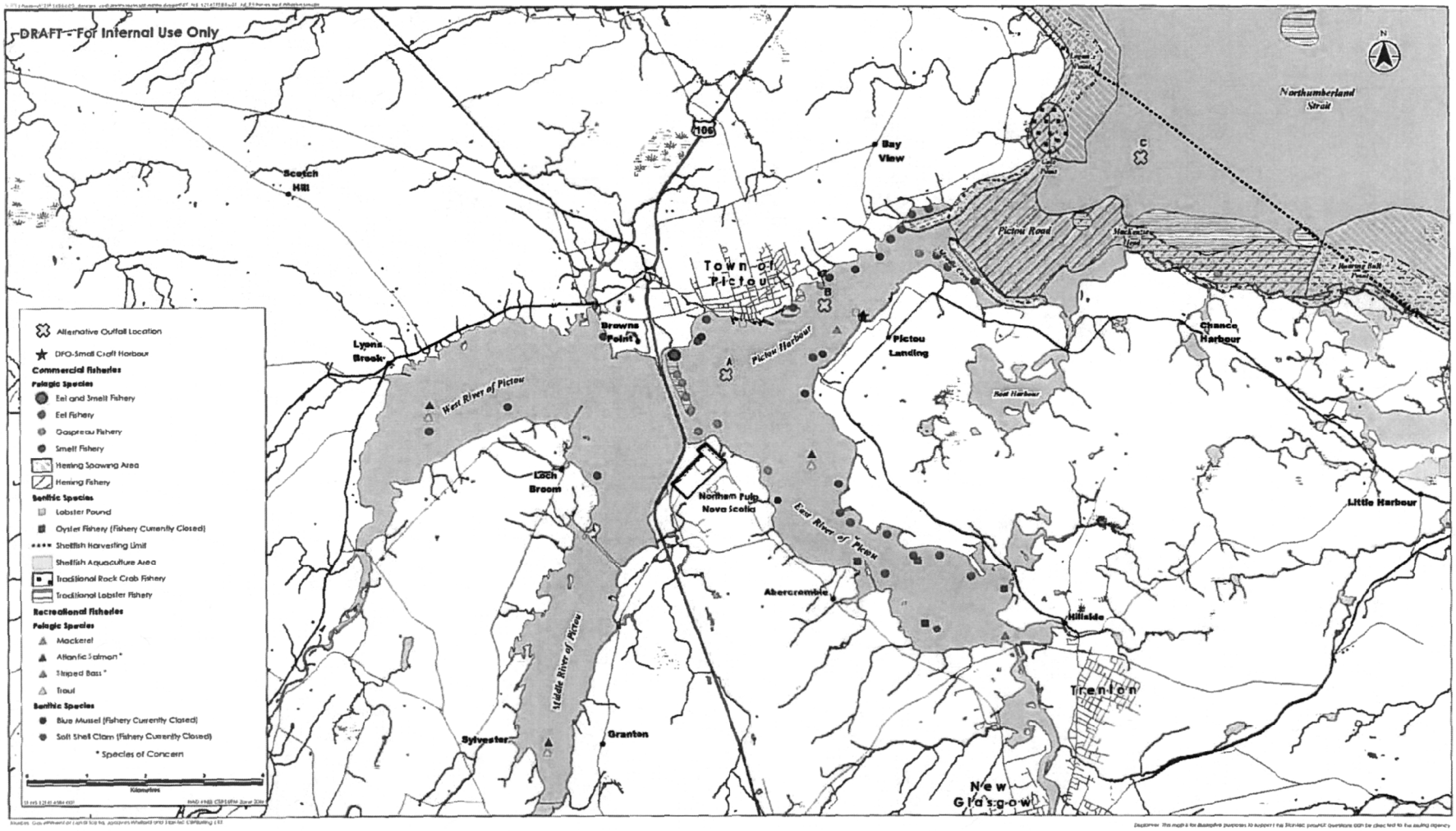
An approach for the construction of the 9-km outfall pipe was proposed, where the pipe may have to be fabricated and placed in manageable sections of about 1000-m long, and outfitted with bolted flanged connections and expansion joints. The placement of the pipe would generally differ depending on whether it is in the near shore zone, in Pictou Harbour, or in Pictou Road to Northumberland Strait. The pipe installation in the Pictou Harbour near-shore zone to the mill would be in a pre-excavated trench, buried, and protected with armourstone. The armourstone would extend up the shore to a height sufficient to protect the pipe from physical factors such as high water level, storm surge, sea level rise, wave height, and wave run-up. The construction technique for pipe installation in the near shore zone could be similar to the 2009 East River crossing of the mill's effluent replacement pipe to Boat Harbour. The anticipated relatively deep marine sediment deposits in Pictou Harbour may require the placement of a thick blasted and crushed rock mattress on the bottom in order to partially consolidate the silts and to prepare the bottom to receive the new pipe. The pipe fitted with concrete collars would rest on the mattress and then would be backfilled with a crushed rock backfill to totally cover

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the outfall pipe and to afford the pipe some protection against accidental impacts from vessels and protection against inadvertent anchorage of vessels.

The outfall pipe from Pictou Road to Northumberland Strait to a depth of approximately 10 m at the Alt-C location may encounter the potential for ice scour and disturbance from waves, which should be investigated in more detail. As with the pipe in the near shore zone, it is recommended that a heavier armourstone be used from the main entrance of Pictou Harbour to the outer limits of the diffuser. Diffuser ports should have riser pipe extensions to ensure that the discharge points are clearly above the top of the armourstone protection. Typically, the diffuser ports would be installed by divers after the stone protection is placed. An access hatch should be provided at the end of the outfall pipe so that a remotely-operated vehicle (ROV) video inspection can be done after the protective rock layer is placed on the outfall pipe.

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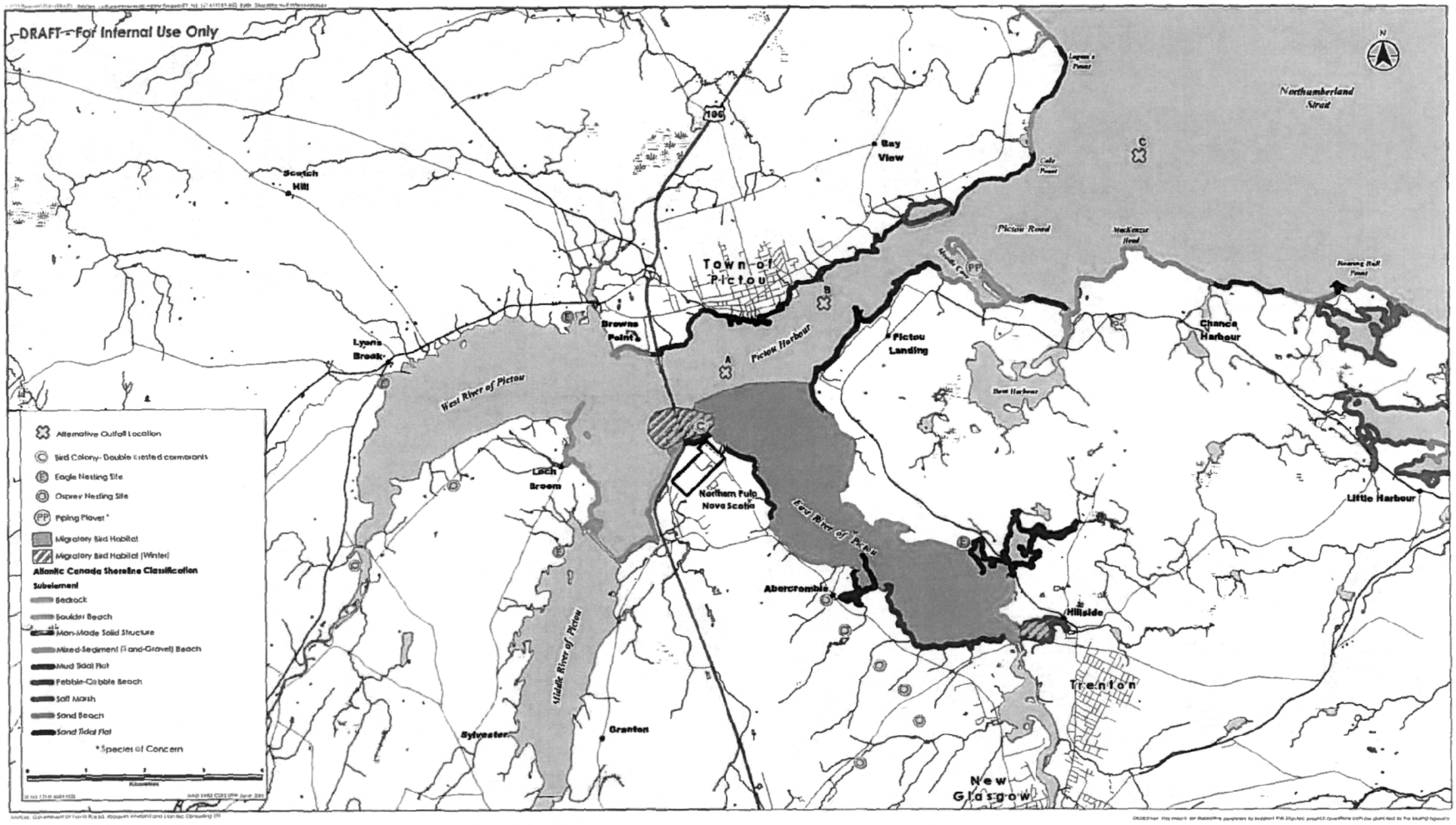
Commercial, Recreational, and Aboriginal Fishery Sensitivities

Stantec

PRELIMINARY RECEIVING WATER STUDY - PICTOU HARBOUR NOVA SCOTIA

Figure 2-11

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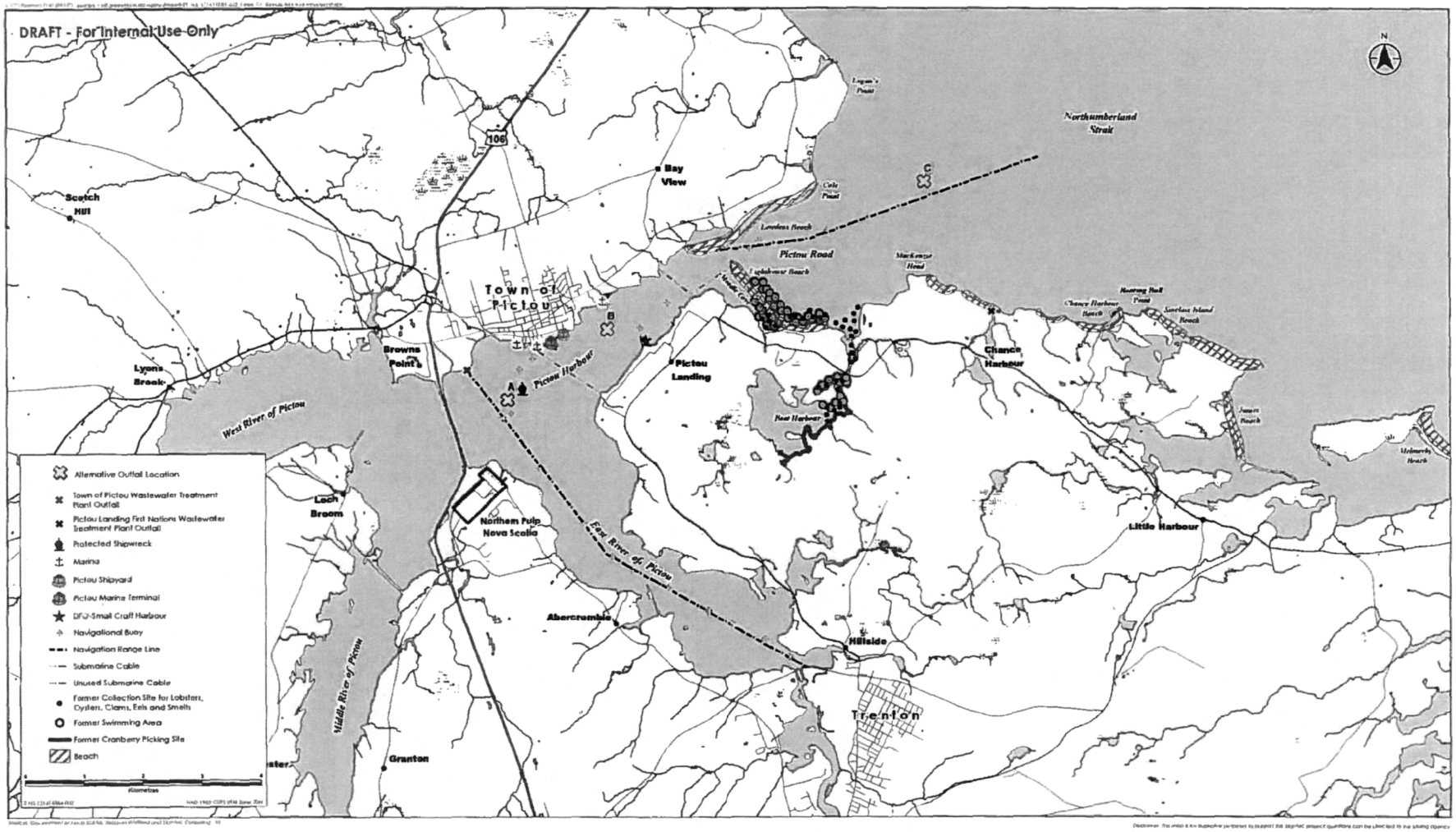
Bird and Shoreline Sensitivities

Stantec

PRELIMINARY RECEIVING WATER STUDY - PICTOU HARBOUR, NOVA SCOTIA

Figure 2-12

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Other Socio-economic Sensitivities

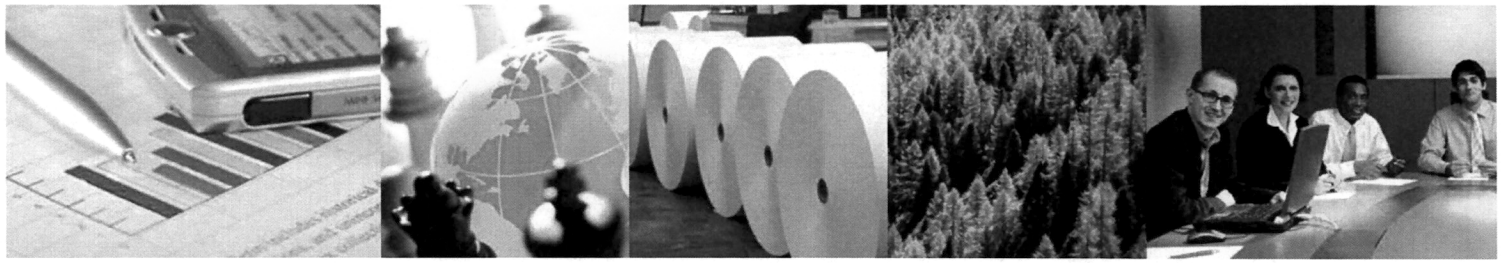
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PRELIMINARY RECEIVING WATER STUDY - PICTOU HARBOUR, NOVA SCOTIA

Figure 2-13

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Northern Pulp Nova Scotia
New Glasgow, NS

Effluent Treatment Plant Replacement, with new Marine Outfall
Project Description

Report No.: 11 1112A, rev. 2

July 2017

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KSH CONSULTING

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Project Background

Background

- NPNS operates a kraft mill located on Abercrombie Point, New Glasgow, NS. The mill has been in operation since 1967 and currently produces 280,000 – 300,000 ADMT/yr bleached (ECF) softwood kraft market pulp;
- At the time of construction, the Nova Scotia Government agreed to build and operate a treatment system for the mill's process effluent;
- The system refurbished in 1996, at which time the mill took over operation of the system;
- Effluent treatment system is located 3.5 km east of the mill and consists of sedimentation basins, followed by aeration in a natural basin equipped with baffle curtains. A large, natural final polishing/stabilization basin follows prior to release to the Northumberland Strait;
- The system has met federal and provincial standards since 1996; and
- With the introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, the use of the provincially-owned facility for the reception and treatment of effluent from the mill will not be permitted after January 31, 2020.

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Mill Map



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New Treatment System

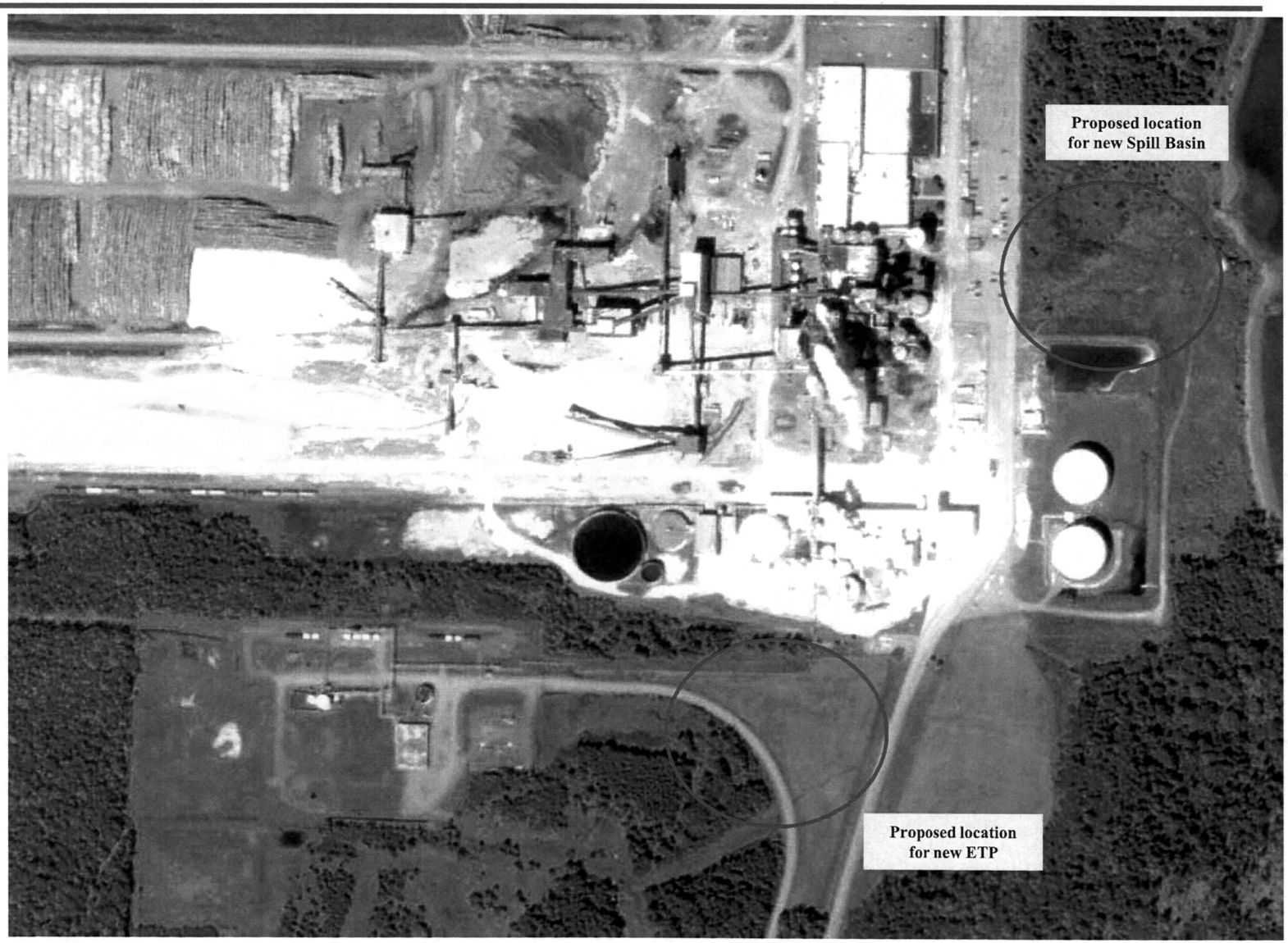
Process Technology : Activated Sludge Treatment (AST)

- Process Steps:
  - Spill Basin;
  - Primary Clarifier;
  - Effluent Cooling;
  - Aeration Basin;
  - Secondary Clarifiers; and
  - Treatment Building (aerators, sludge dewatering etc…).
- Flow would arrive via the existing acid and alkaline sewers to the area near the ash pond;
- Headworks would require minor modification to allow for diversion of the effluent flow to the new spill pond. The existing lift station already has a chamber dedicated to this. Some sluice gates and controls to be added;
- The existing lift station would be used to feed the effluent to the primary clarifier and would include a new mechanical bar screen, which will replace the existing manual screen, to remove large material prior to pumping;
- The clarified effluent would then be cooled indirectly, through a heat exchanger network and a clean cooling tower loop;
- Cooled effluent would then be fed to a pre-aeration (selector) basin prior to the main aeration basin where air would be injected using blowers through a series of specialized mixer/aerators;
- Discharged effluent flows to dual secondary clarifiers for separation of biosolids, with most being recycled back to the front end. Waste sludge would be pumped to new dewatering equipment; and
- A new lift station would be built to send the treated effluent to Northumberland Strait via a new, submerged marine outfall.

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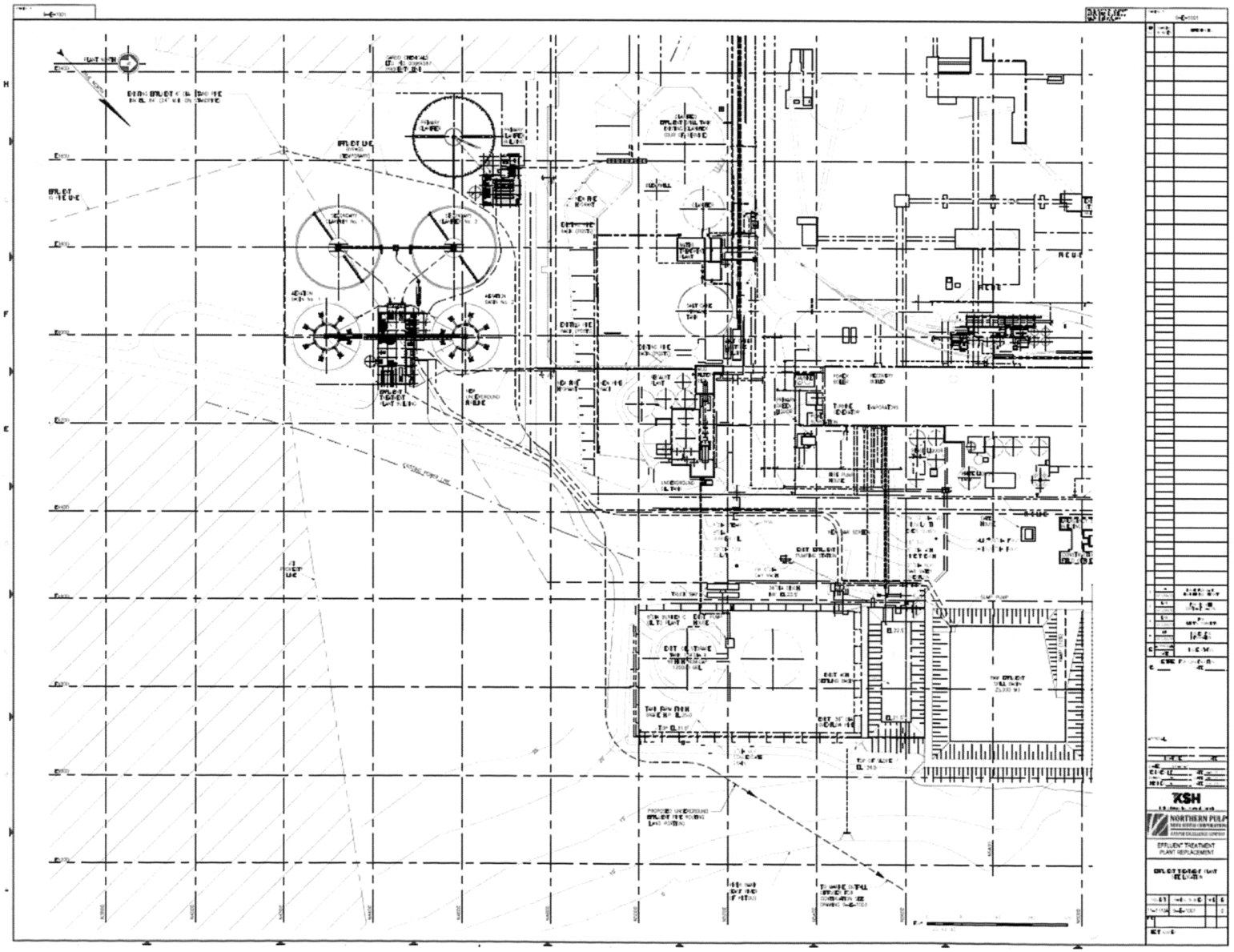
Proposed Location for New Effluent Treatment Plant (ETP)



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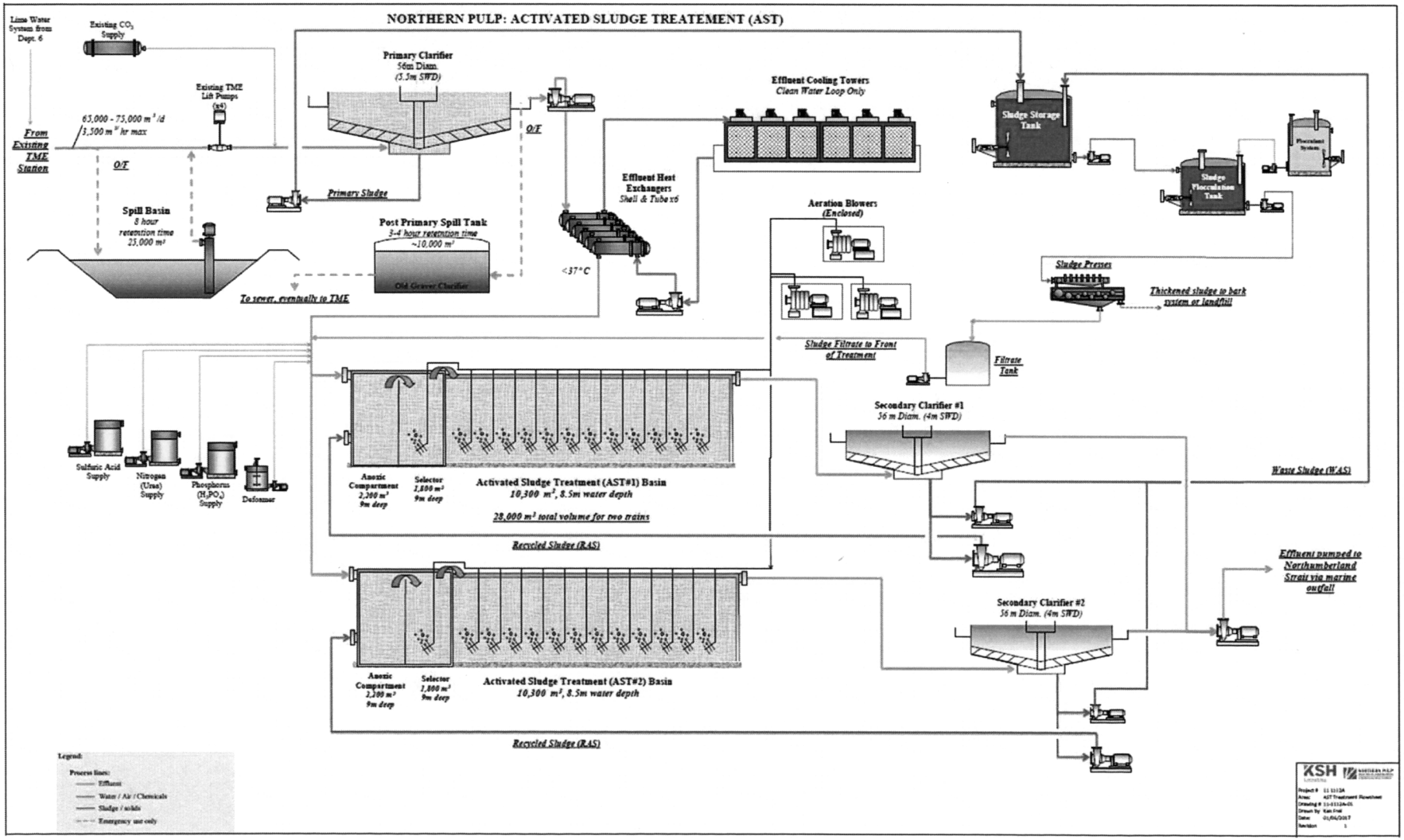
Layout of New ETP *(full drawing available)*



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Process Flow Diagram, New ETP *(full drawing available)*



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pH Control and Spill Management

- Using the existing mill effluent collection system, the raw effluent will be coarse-screened using a new automated bar screen, which will replace the existing manual bar scree and will remove large objects that could otherwise damage the lift station and other subsequent process equipment;
- From there, the effluent is directed to the existing lift station, where centrifugal pumps send the effluent to the new treatment system;
- Effluent pH is adjusted using the existing control system, which consists of the addition of either carbon dioxide (CO_2) (high pH) or lime water (low pH) at the inlet of the pumps. A sulphuric acid, tote-based addition system will also been installed to complement the CO_2 metering system;
- In times of process upsets, spills or other unusual events, the effluent will be diverted to a new spill basin:
  - Volume: 25,000 m^3;
  - HDPE-lined, earthern basin, which would be built in the vicinity of the existing ash pond.
- A secondary spill containment system for clarified effluent will also be in place:
  - Reuse of the existing Graver clarifier;
  - Volume: 10,000 m^3.
- Diverted effluent would either be metered back into the effluent stream with dedicated pumps once it has been deemed safe to do so or treated and disposed of by other means, as required.

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Primary Clarification

- Primary clarification is the physical treatment process of removing solids before biological treatment:
  - Process water enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while settleable solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system; and
  - Effluent destined for biological treatment leaves the clarifier over a weir.
- A new, 56m diameter, peripheral drive gravity clarifier will be installed west of the mill's main access road to remove the solids contained in the effluent prior to secondary treatment:
  - The clarified effluent is collected in a standpipe and sent, via a new lift station, to a new cooling system; and
  - Solids will be collected at the bottom of the clarifier and sent to a new sludge dewatering facility.
- This process uses the same principles as the current method of effluent clarification (settling basins), except that it does it more efficiently, in less time and virtually eliminates the risk of odour generation from the potential decomposition of solids in a settling basin.

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Effluent Cooling

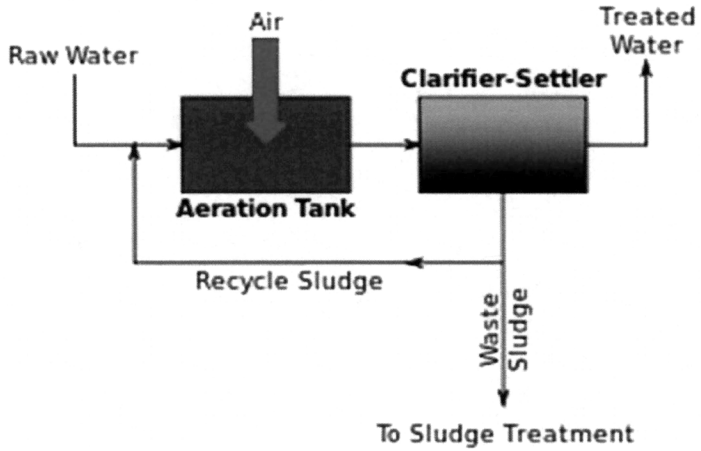
- After primary clarification, the effluent will be cooled, using an indirect cooling loop, prior to aerobic treatment;
- This cooling is necessary to ensure proper treatment:
  - Effluent temperature is approximately 48°C while treatment temperatures is required to be around 37 °C;
- A system of heat exchangers will be used for this cooling, using fresh water as the cooling medium;
- The cooled effluent will be directed, by gravity, to the secondary treatment system while the heated fresh water will be sent to a series of direct cooling towers, which will dissipate the heat of the effluent in the air:
  - Once "free" of this heat, the fresh water will be reused for cooling and in the mill processes.

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Activated Sludge Treatment (AST)

- Activated sludge treatment is a biological wastewater treatment process widely used for the secondary treatment of both domestic and industrial wastewater, particularly waste streams high in organic or biodegradable content.
- Activated sludge is a term used to describe the microbe-rich deposits in settling tanks and basins that are gradually added to incoming wastewater in a treatment facility. The resulting mixture is aerated so the microorganisms can decompose any organic materials into water, carbon dioxide, and other compounds. After decomposition, any debris remaining can easily settle in the water.



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Aeration Basin

- The treatment system will consist of 2 circular aerated basin, each with a volume of 14,000 m^3, (45 m diameter x 9 m depth), providing approximately 9 hours of retention of effectively remove from 90 to 95% of the BOD contained in the effluent;
- Aeration will be provided by a series of subsurface mixer/aerators, which will keep the basins thoroughly mixed and provide the necessary oxygen to support the microbial degradation of BOD within the basin;
- This process is essentially the same as what is currently used at the mill (aerated stabilization basin), but is occurs at a much faster pace.

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Secondary Clarification

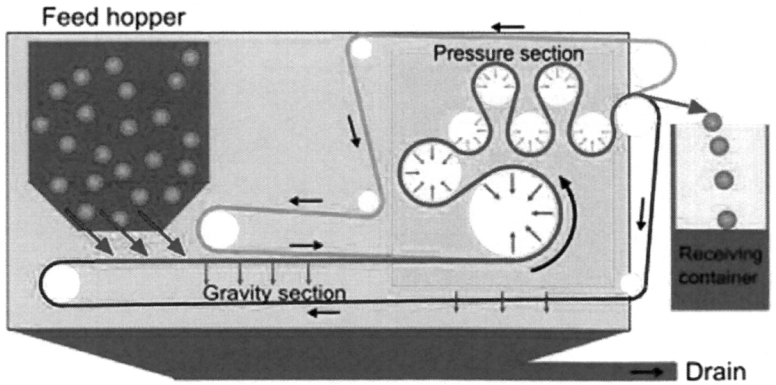
- Secondary clarification is essentially the same process as primary clarification, except that it removes the solids generated during biological treatment:
  - Treated effluent enters the clarifier tank and floatable solids (scum) are removed from the surface by skimmers while settleable solids (sludge) are collected on the bottom by a rake and removed via a sludge removal system.
- Two new, 56m diameter, peripheral-drive suction clarifiers will be installed next to the aeration tanks to remove the solids contained in the treated effluent:
  - The clarified, treated effluent is collected in a standpipe and sent, via a new lift station, to the new marine outfall; and
  - Solids will be collected at the bottom of the clarifier and sent to a new sludge dewatering facility.
- This process occurs unassisted in the existing wastewater treatment system.

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Sludge Dewatering

- The sludges generated during primary and secondary treatment are blended and thickened using two distinct processes:
  - Gravity dewatering table: this pre-thickening step is required to reduce the quantity of free-standing water and facilitates the overall dewatering process;
  - Belt press: a **belt filter** is used for solid/liquid separation processes, where the process of filtration is primarily obtained by passing a pair of filtering cloths and belts through a system of rollers. The system takes a sludge or slurry as a feed, and separates it into a filtrate and a solid cake;
  - Two belt presses will be used to dewater the sludge generated in the process; and
  - Dewatered sludge will be sent to various disposal methods, ranging from landfill to combustion in the mill's existing bark boiler to agricultural uses (soil amendment, fertilizer, etc.).



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Effluent Discharge

- The treated effluent will be directed, by gravity, to a new pumping station, where it will be pressurized and sent through a new, submerged marine outfall for final discharge into Northumberland Strait;
- This outfall, made of high density polyethylene (HDPE) pipe, will be laid down at the bottom of Pictou Harbour and equipped with a diffuser system that will ensure adequate dispersion of the effluent at the point of discharge, thereby causing minimal effect on the receiving water and its contents; and
- The exact location and routing of this outfall, as well as the diffuser configuration, will be determined using 2D and 3D modelling of Pictou Harbour.

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Receiving Water Study and Outfall Routing

- The key objective of the receiving water study is to determine the optimum location for the new mill outfall discharge among four possible discharge points:
  - Approximately 500 m from the Causeway Outlet;
    - This point was dismissed quickly, as it offers no effluent dispersion potential.
  - Between 1 and 2 km past the mill towards the centre of Pictou Harbour;
  - Approximately 6 km from the mill at Lighthouse Point;
  - Approximately 9 km from the mill at the edge of Northumberland Strait; and
  - Approximately 10.5 km from the mill at the edge of Northumberland Strait (deeper discharge point).

- Points were selected in consideration of the following issues:
  - Fisheries;
  - Birds and other wildlife;
  - Social sensitivities; and
  - Constructability.

- It is possible that alternate discharge locations may be proposed, based on the results of the study and discussions with vendors on possible treatment plant performance levels;

- Model built with Boat Harbour basin in its future state (tidal).

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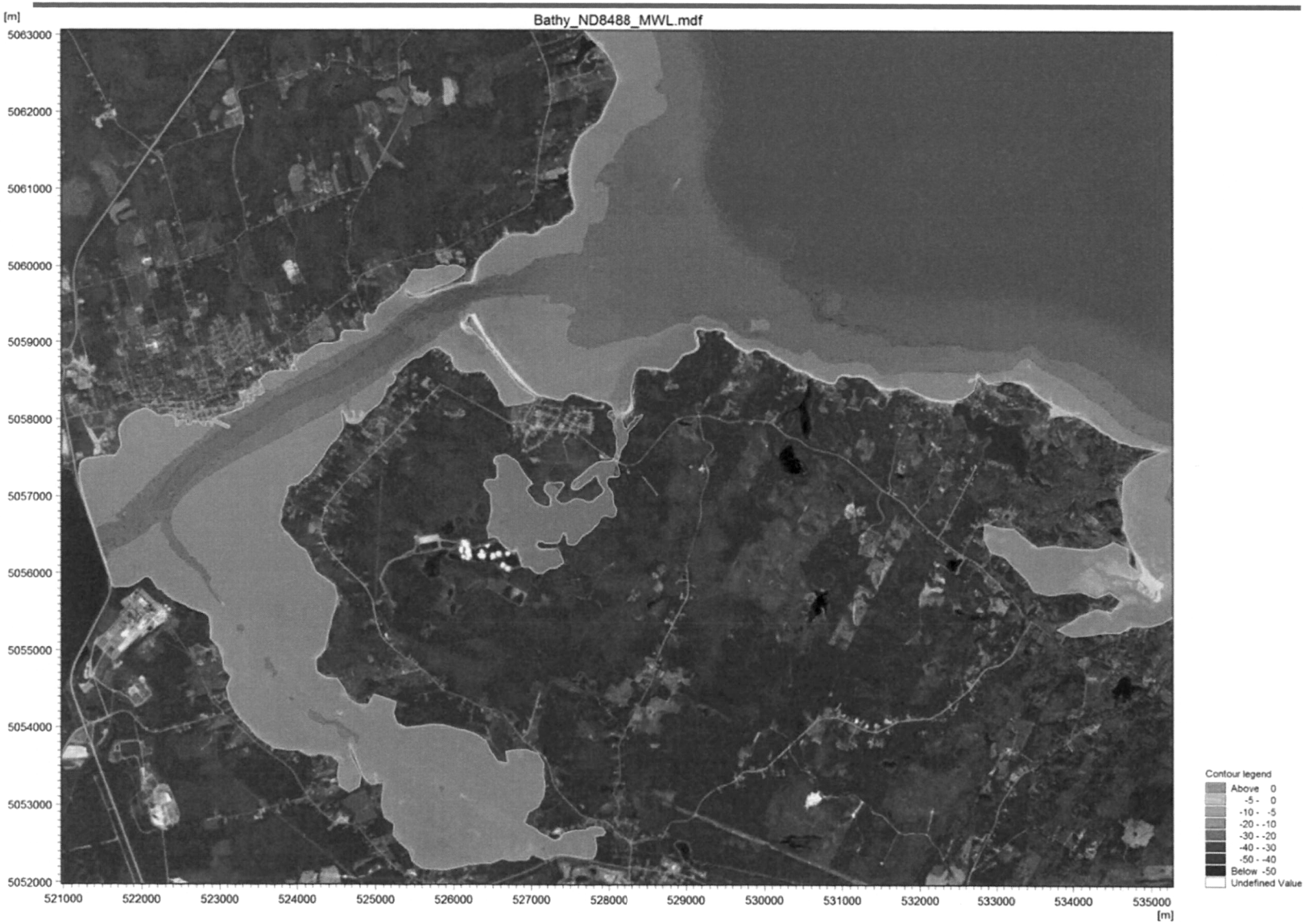
Tasks Involved in Receiving Water Study

- Background review and data collection of relevant information:
  - This task will include determination of regulatory guidelines and criteria for marine waste water discharge:
    - Bathymetry, water levels and currents, wind records, ambient water quality, effluent discharge, regulatory guidelines.
- Far-field hydrodynamic and water quality modelling using the MIKE21 Coupled Model:
  - This task will include identification of the dispersion extent of discharged waste water and recommendation for the outfall end-of-pipe location.
- Near-field mixing modelling of effluent characteristics and estimating the size of the initial mixing zone using a CORMIX model:
  - Results will be compared to federal and provincial water quality guidelines for protection of marine aquatic life; and
  - This task will include identification of outfall diffuser configurations that will suit the effluent dispersion characteristics, through testing of several outfall locations and configurations to determine the preferred alternative based on computed dilution factor at the limit of the regulatory mixing zone (RMZ).
- Assessment of environmental effects of the effluent discharge on the receiving environment in the far- field and near-field areas of Pictou Harbour; and
- Evaluation of impact of flow and organic loading changes in treated effluent quality on dispersion modelling results.

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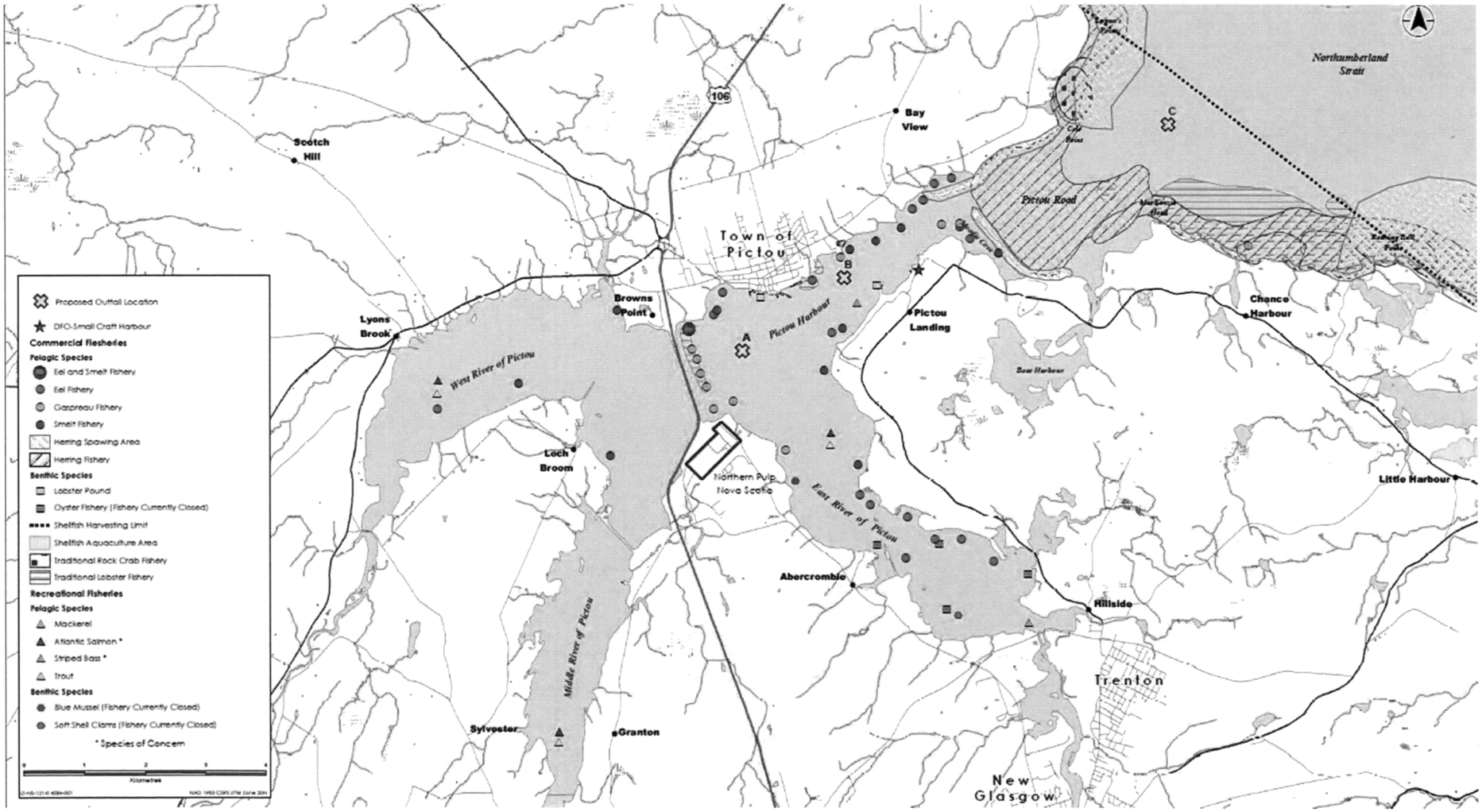
Depth Profile, Pictou Harbour



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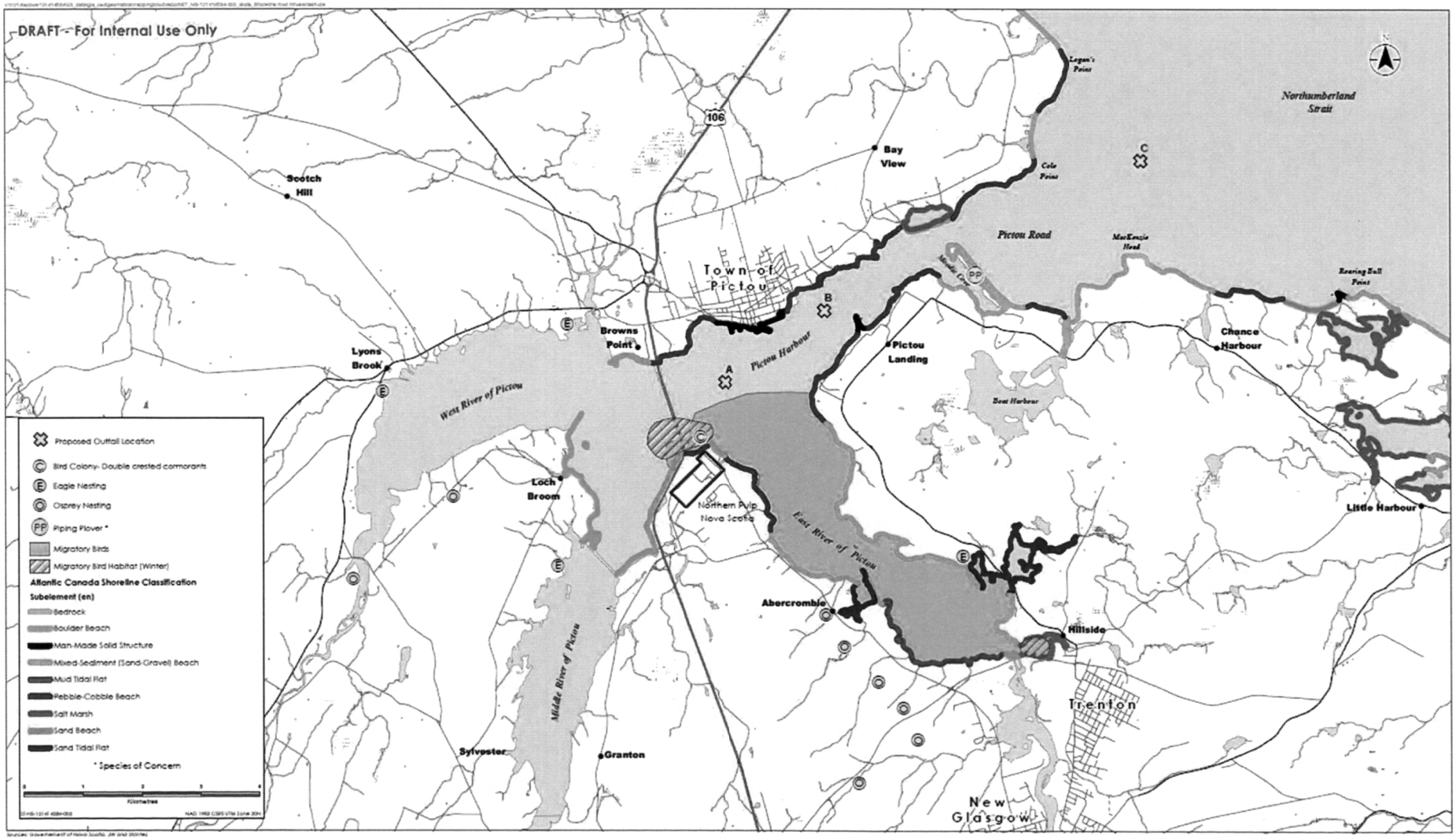
Considerations Taken to Locate Discharge Points
Fisheries



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Considerations Taken to Locate Discharge Points
Birds and Shoreline

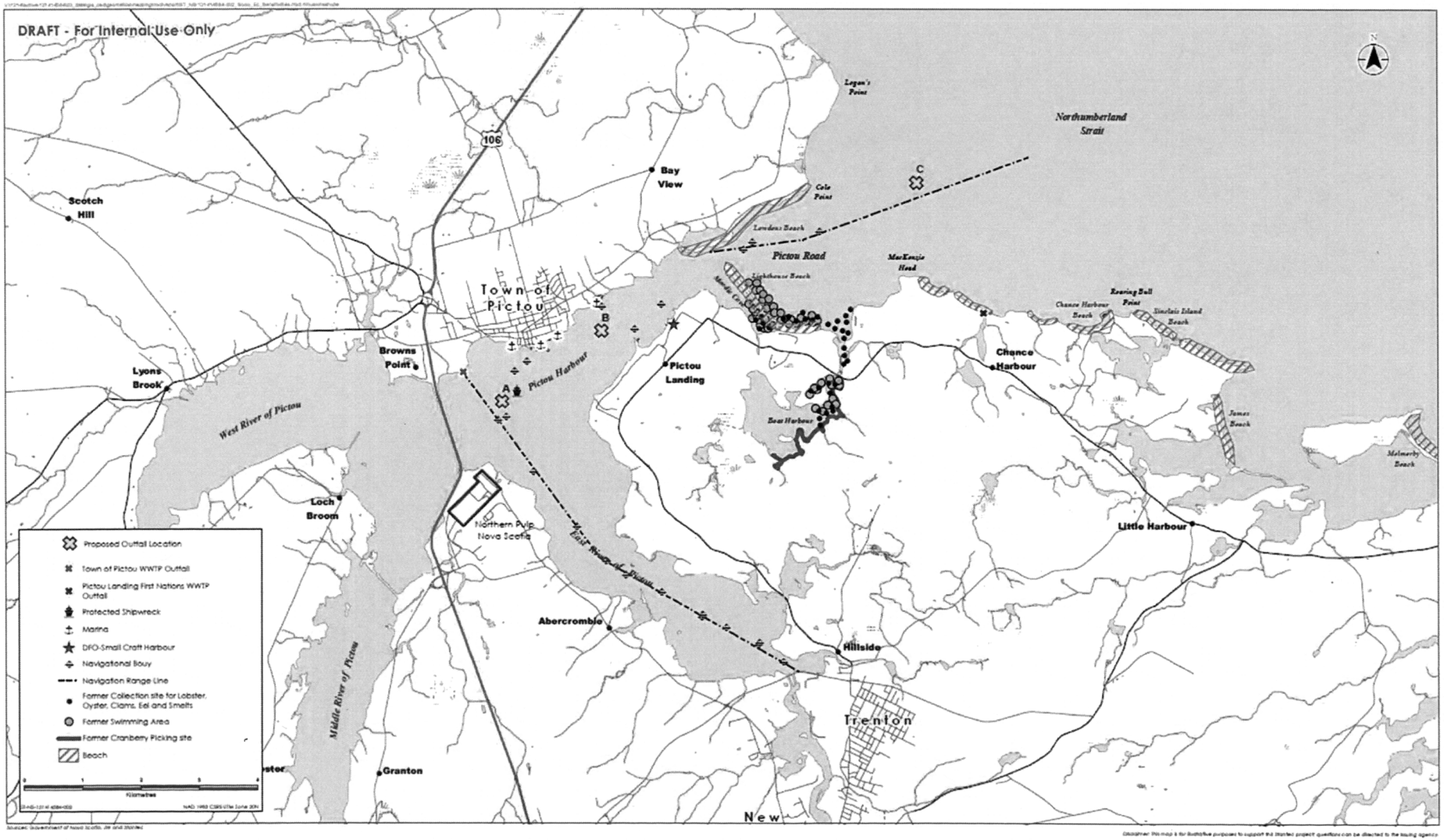


Bird and Shoreline Sensitivities

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Considerations Taken to Locate Discharge Points
Socio-economic Sensitivities



Other Socioeconomic Sensitivities

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Outfall Location

- The best location for the outfall was found to be at the furthest point studied, approximately 10.5 km from the mill:
  - Minimizes the possibility of effluent backwash into Boat Harbour; and
  - Provides good diffusion of the effluent without in proximity of the discharge point.
- Using a six-port diffuser, the 3D modelling results show that the proposed effluent criteria for AOX, nitrogen, phosphorus, colour, BOD, COD, TSS, water temperature, dissolved oxygen and pH are well in compliance with all applicable federal and provincial water quality guidelines at the end of the 100-m mixing zone.

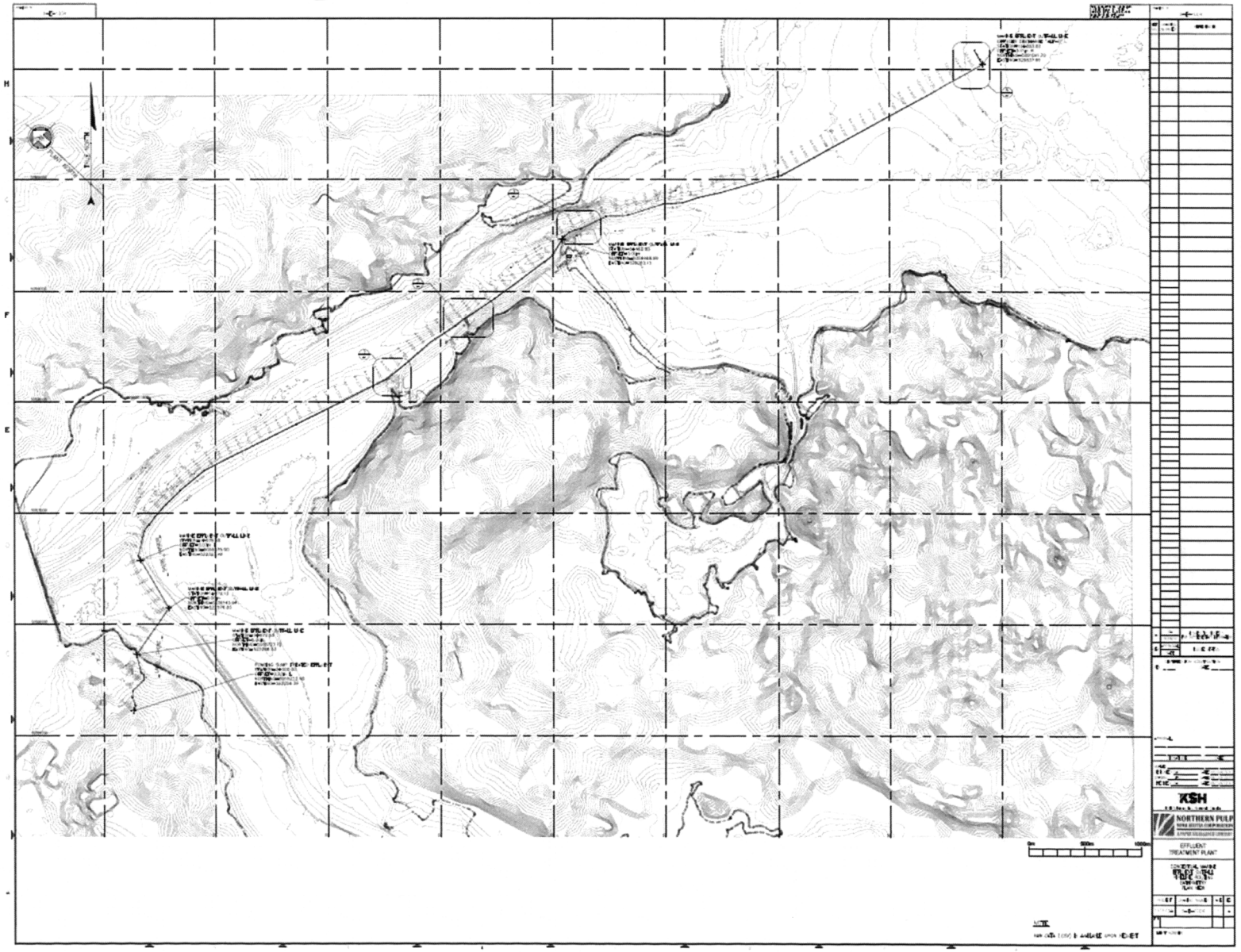
Parameter	Unit	Daily Max Value	CCME Marine Guideline	Ambient Conditions	End of Mixing Zone
AOX	mg/L	7.8	N/A	Trace amount	0.07
Nitrogen	mg/L	3.0	45 (NO_3^- as N)	0.24	0.24
Phosphorus	mg/L	1.5	N/A	0.35	0.35
Colour	TCU	750	N/A	10.8	10.8
COD	mg/L	725	N/A	N/A	6.6
BOD_5	mg/L	48	N/A	N/A	0.4
TSS	mg/L	48	Narrative[1]	8.5	8.5
Dissolved Oxygen	mg/L	> 1.5	> 8.0	7.2	7.2
pH	---	7.0 – 8.5	7.0 – 8.7	8.0	7.0 – 8.5
Summer Temperature	°C	37	Narrative[2]	17.8 (summer) 0 (winter)	17.8 (summer) 0.2 (winter)

Notes:
[1]Maximum average increase of 5 mg/L from background levels for longer-term exposures (e.g., inputs lasting between 24 h and 30 d)
[2] Human activities should not cause changes in ambient temperature of marine and estuarine water to exceed ±1°C at any time, location, or depth

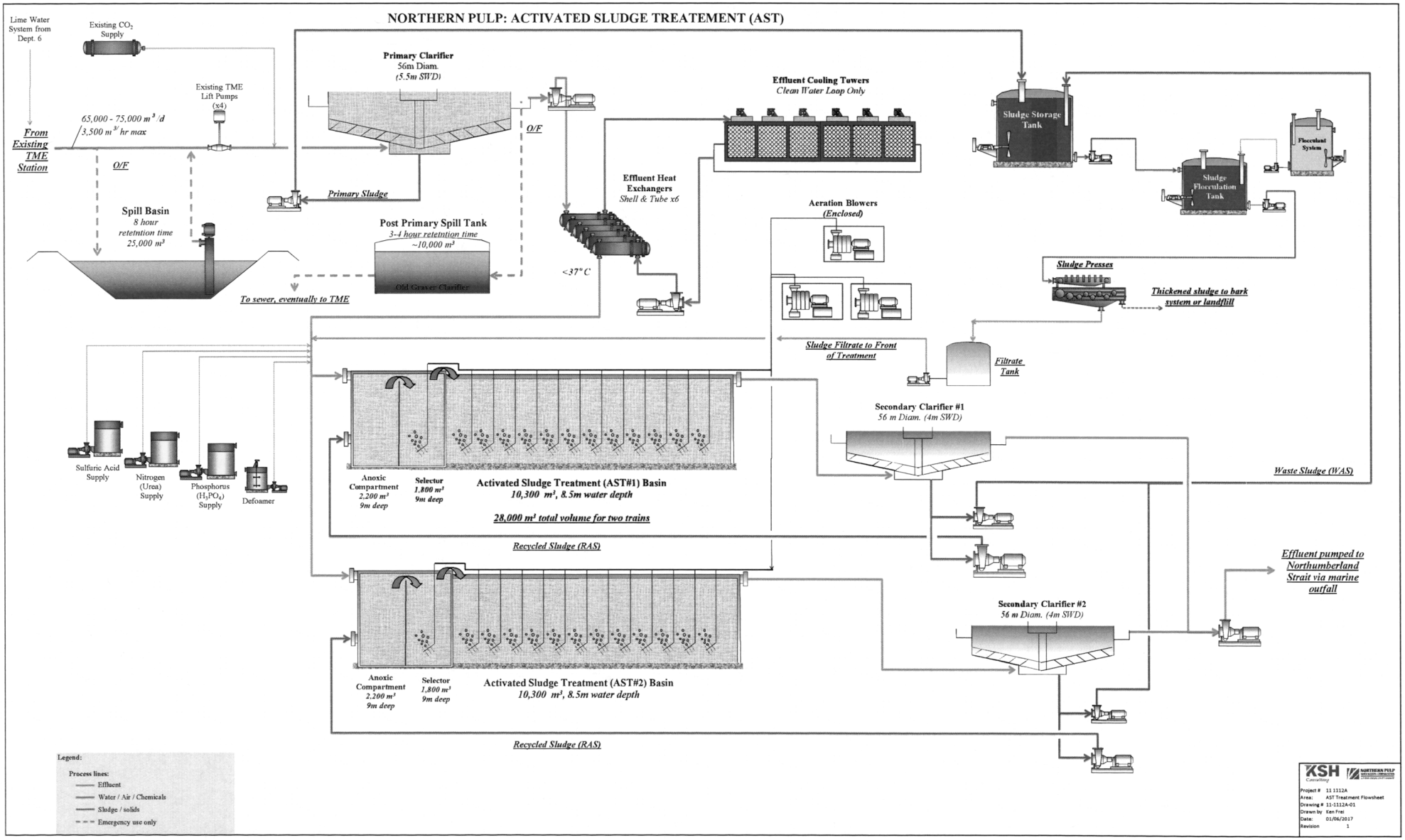
Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

KSH Consulting

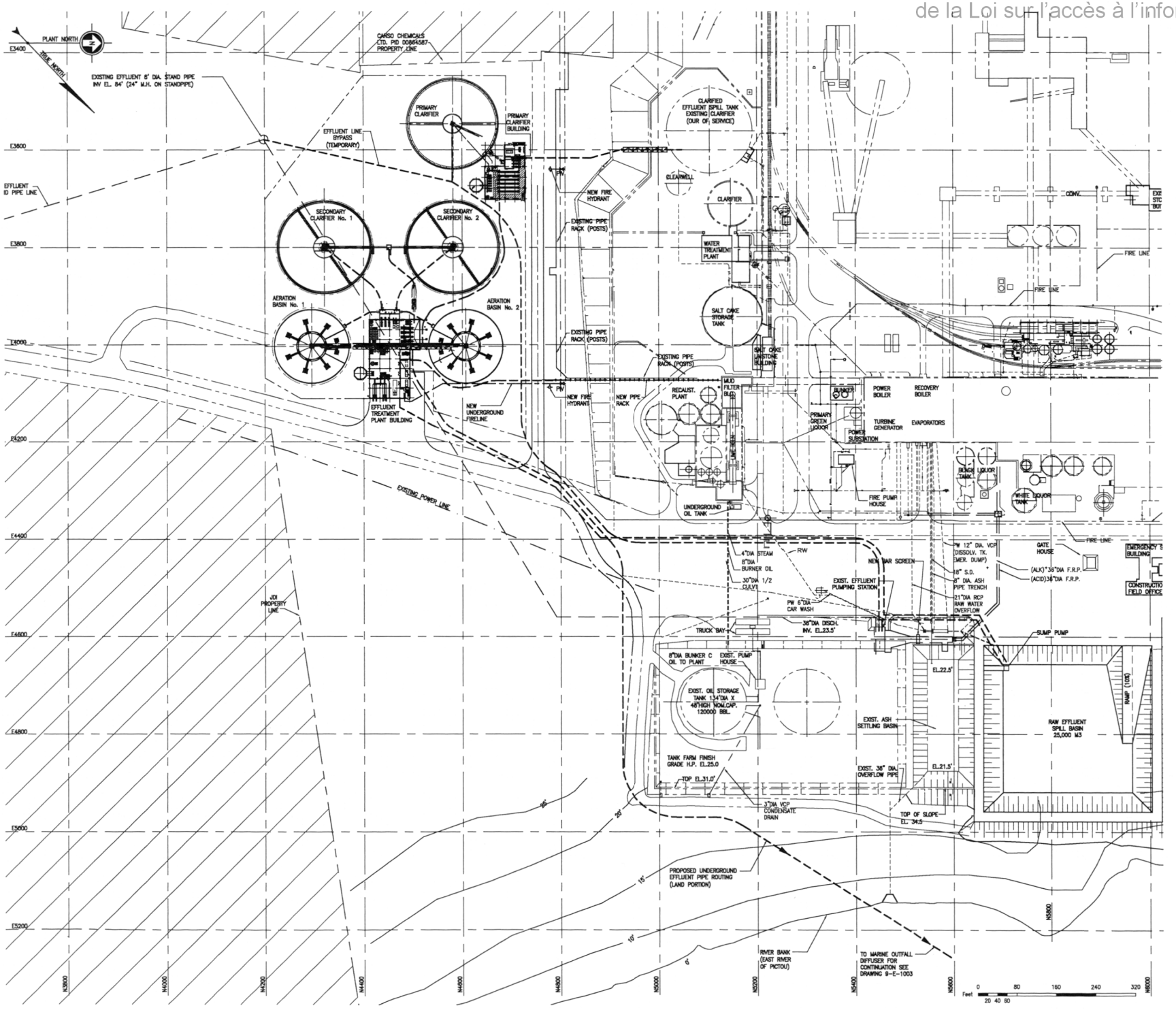
Outfall Routing *(full drawing available)*



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REF. DRAWING No. NUMBER	REFERENCES

REV	BY / DATE	ISSUE STATUS
D	DA 2017/08/29	ISSUE FOR BASIC ENGINEERING REPORT
C	LAM 2017/04/20	FOR BID WITH CONTRACT C-3060
B	LAM 2017/04/12	FOR CLIENT'S COMMENTS
A	EF 2017/02/28	ISSUED FOR INFORMATION
REV	APPROVAL DATE	ISSUE STATUS

CERTIFIED FOR CONSTRUCTION
REV.: DATE:

APPROVAL

SIGNATURE DATE

SCALE: 1/64"=1'-0"
DESIGNED: EF DATE: MAR 2017
DRAWN: SMR DATE: MAR 2017
CHECKED: DA DATE: JUN 2017

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EFFLUENT TREATMENT PLANT REPLACEMENT

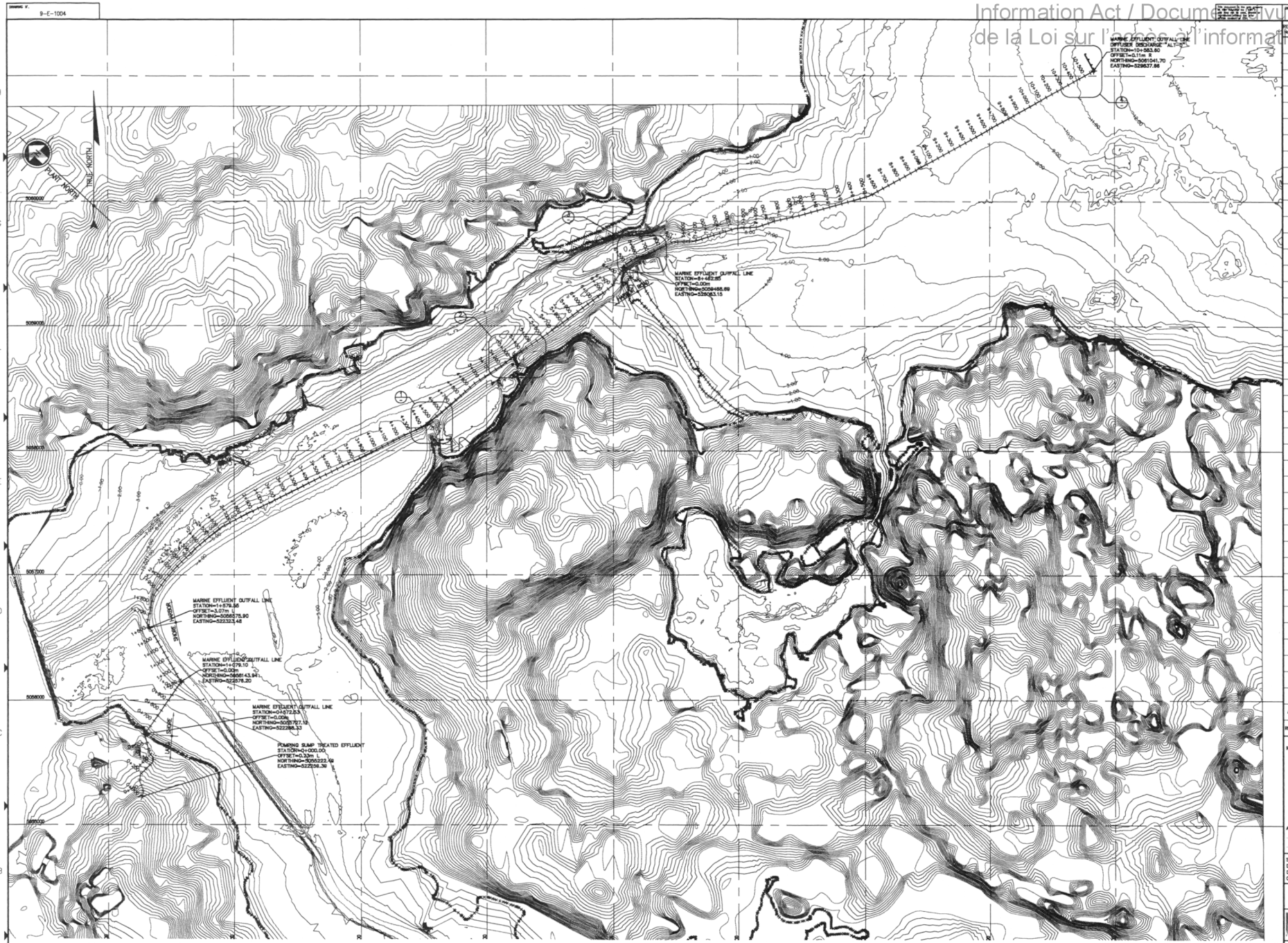
EFFLUENT TREATMENT PLANT SITE LOCATION

PROJECT	DRAWING NUMBER	PAGE	REV.
11-1112A	9-E-1001		D

TYP.

CLIENT NUMBER: 000107

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REF. DRAWING No. / NUMBER	REFERENCES

REV	APPROVAL DATE	ISSUE STATUS
A	DA 14/06/17	ISSUED TO BIDDER'S FOR SUPPLEMENTARY INFORMATION

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REV.: DATE:

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SIGNATURE DATE

SCALE:
DESIGNED: DA DATE: 08/JAN/2017
DRAWN: JFN DATE: 08/JAN/2017
CHECKED: DA DATE: 08/JAN/2017

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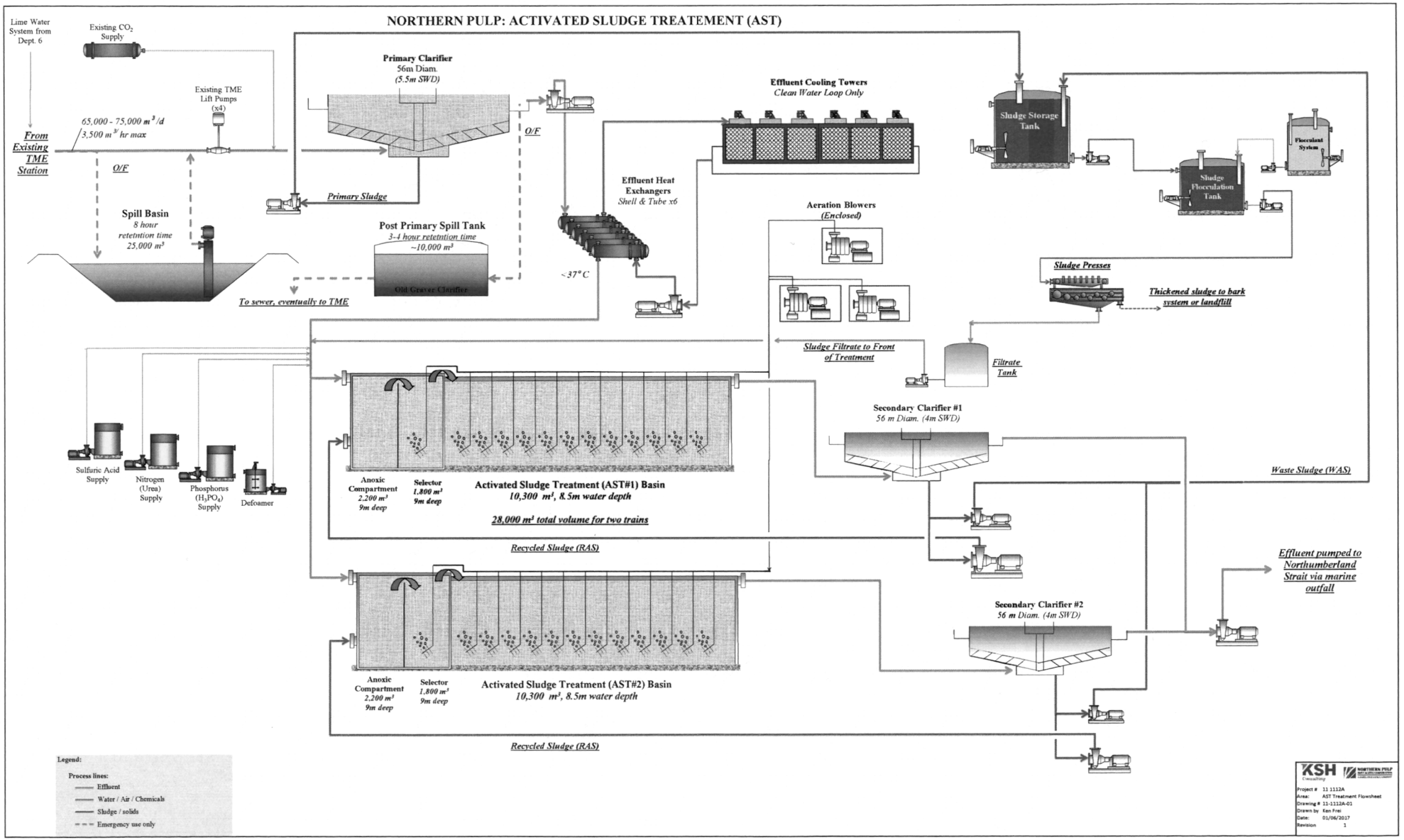
EFFLUENT TREATMENT PLANT

CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING BATHYMETRY PLAN VIEW

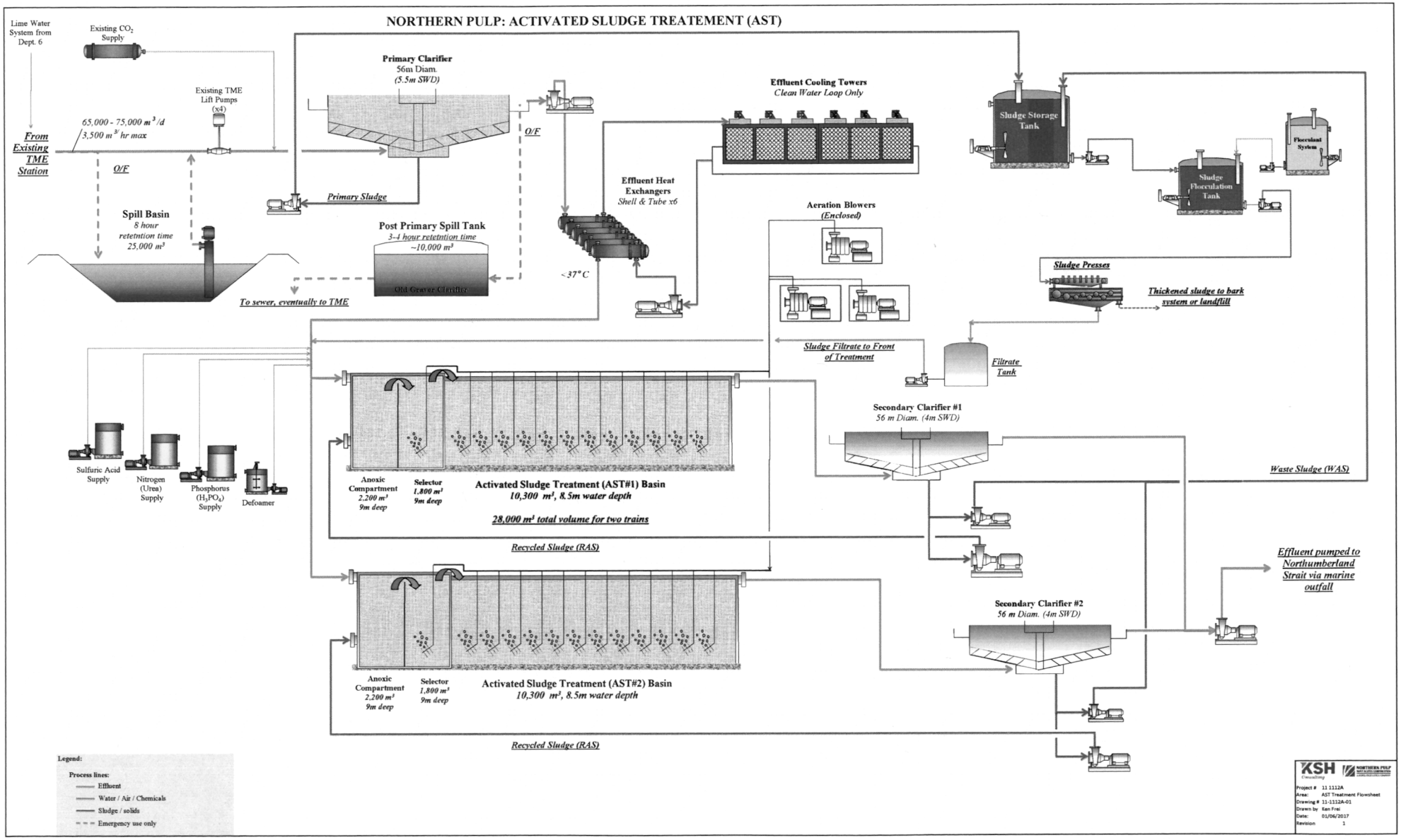
PROJECT	DRAWING NUMBER	PAGE	REV.
111112A	9-E-1004	1	A

CLIENT NUMBER: 000108

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Wambolt, Michael

From: MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Sent: July-20-17 9:14 AM
To: Wambolt, Michael
Cc: Jalloh, Rugi; Yeh, Helen X
Subject: RE: Northern Pulp Effluent Treatment Plant Replacement, with new Marine Outfall-EA Scoping Meeting

Hello Mike/Rugi,

Could you give us an indication of DFO's requirements for this project:

Any authorizations?
Fish/fish habitat surveys (any seasonality?)

Anything else?

Thank you,
Helen

From: Yeh, Helen X
Sent: Thursday, July 20, 2017 9:07 AM
To: MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Subject: FW: Northern Pulp Effluent Treatment Plant Replacement, with new Marine Outfall-EA Scoping Meeting

From: Wambolt, Michael [mailto:Michael.Wambolt@dfo-mpo.gc.ca]
Sent: Thursday, July 20, 2017 9:07 AM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>
Subject: Re: Northern Pulp Effluent Treatment Plant Replacement, with new Marine Outfall-EA Scoping Meeting

Good morning Helen,
Unfortunately I will not be able to attend today's meeting. Please let Rugi or I know if you have any specific questions for DFO.

Cheers,

Mike Wambolt
A/Section Head / Chef de section
902-402-5851

Fisheries Protection Program | Programme de Protection des Pêches
Ecosystem Management | Gestion des Ecosystemes
Maritimes Region | Region des Maritimes
Fisheries and Oceans Canada | Pêches et Océans Canada
Government of Canada | Gouvernement du Canada

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From: Yeh, Helen X
Sent: Monday, July 17, 2017 13:29
To: Wright, Patricia E; 'fcr_tracker@ec.gc.ca'; FPP.MAR / PPP.MAR (DFO/MPO); Petrie, Bob D; Elderkin, Mark; Steele, Cynthia; Hollett, Jason; 'TCFCRMAR@tc.gc.ca'; Dera, Beata E; Currie, Paul D; Keats, Paul J; Murphy, Andrew (ENV); Jadot, Sarah X; Vervaet, Sharon; Johnson, Kathleen; Fuller, Adrian M; Weseloh McKeane, Sean; Hilchey, Krista G; 'terri.fraser@northernpulp.com'; Porter, Gary S; MacPhail, Helen
Cc: Boates, J Sherman; Flanagan, Jason; Grant, MT (EC); Daigle, Jennifer; Wambolt, Michael; Ripley, Carl
Subject: RE: Northern Pulp Effluent Treatment Plant Replacement, with new Marine Outfall-EA Scoping Meeting

Hi everyone,

Please see attached the Northern Pulp project description for the Thursday meeting (4 documents in total).

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 424-1514
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

-----Original Appointment-----
From: Wright, Patricia E
Sent: Friday, July 07, 2017 2:53 PM
To: Wright, Patricia E; 'fcr_tracker@ec.gc.ca'; 'referralsmaritimes@dfo-mpo.gc.ca'; Petrie, Bob D; Elderkin, Mark; Steele, Cynthia; Hollett, Jason; 'TCFCRMAR@tc.gc.ca'; Dera, Beata E; Currie, Paul D; Keats, Paul J; Murphy, Andrew (ENV); Jadot, Sarah X; Vervaet, Sharon; Johnson, Kathleen; Fuller, Adrian M; Weseloh McKeane, Sean; Hilchey, Krista G; Yeh, Helen X; 'terri.fraser@northernpulp.com'; Porter, Gary S; MacPhail, Helen
Cc: Boates, J Sherman; Flanagan, Jason; Grant, MT (EC); Daigle, Jennifer; Wambolt, Michael; Ripley, Carl
Subject: Northern Pulp Effluent Treatment Plant Replacement, with new Marine Outfall-EA Scoping Meeting
When: Thursday, July 20, 2017 1:00 PM-3:30 PM (UTC-04:00) Atlantic Time (Canada).
Where: Barrington Tower, Boardroom 18C

s.19(1)

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Jalloh, Rugi

From: Guy R. Martin [redacted]
Sent: August-09-17 9:40 PM
To: Jalloh, Rugi
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)
Attachments: Northern Pulp outfall details.pdf

Hello Rugi,

Attached please find detailed drawings of the proposed outfall routing for this project. More is included in the receiving water study we recently completed for Northern Pulp. The final version is almost ready and will be forwarded to you as soon as it is issued, likely early next week.

Please let me know if you have any further questions.

Regards,

Guy

.....
Guy R. Martin, ing
Conseiller Principal, Procédés et Environnement /
Principal Consultant, Process and Environment

KSH Consulting
1 Place Alexis Nihon
3400 de Maisonneuve O., bureau 1500
Montréal (Québec) Canada H3Z 3B8
T [redacted] **M** [redacted] **F** 514.939.5266

KSH

www.ksh.ca

From: Jalloh, Rugi [mailto:Rugi.Jalloh@dfo-mpo.gc.ca]
Sent: August-09-17 9:49 AM
To: Guy R. Martin
Subject: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

Hello Guy,
I left you a message on your voicemail regarding application received for the above referenced project. I need a few clarification, would you please give me a call? I am in office today and tomorrow.

Thanks,

Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
Fax/ téléc: 902-426-1489

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1 Challenger Dr./1 promenade Challenger
P.O. Box/C.P. 1006, Station P410
Dartmouth, NS/NE B2Y 4A2

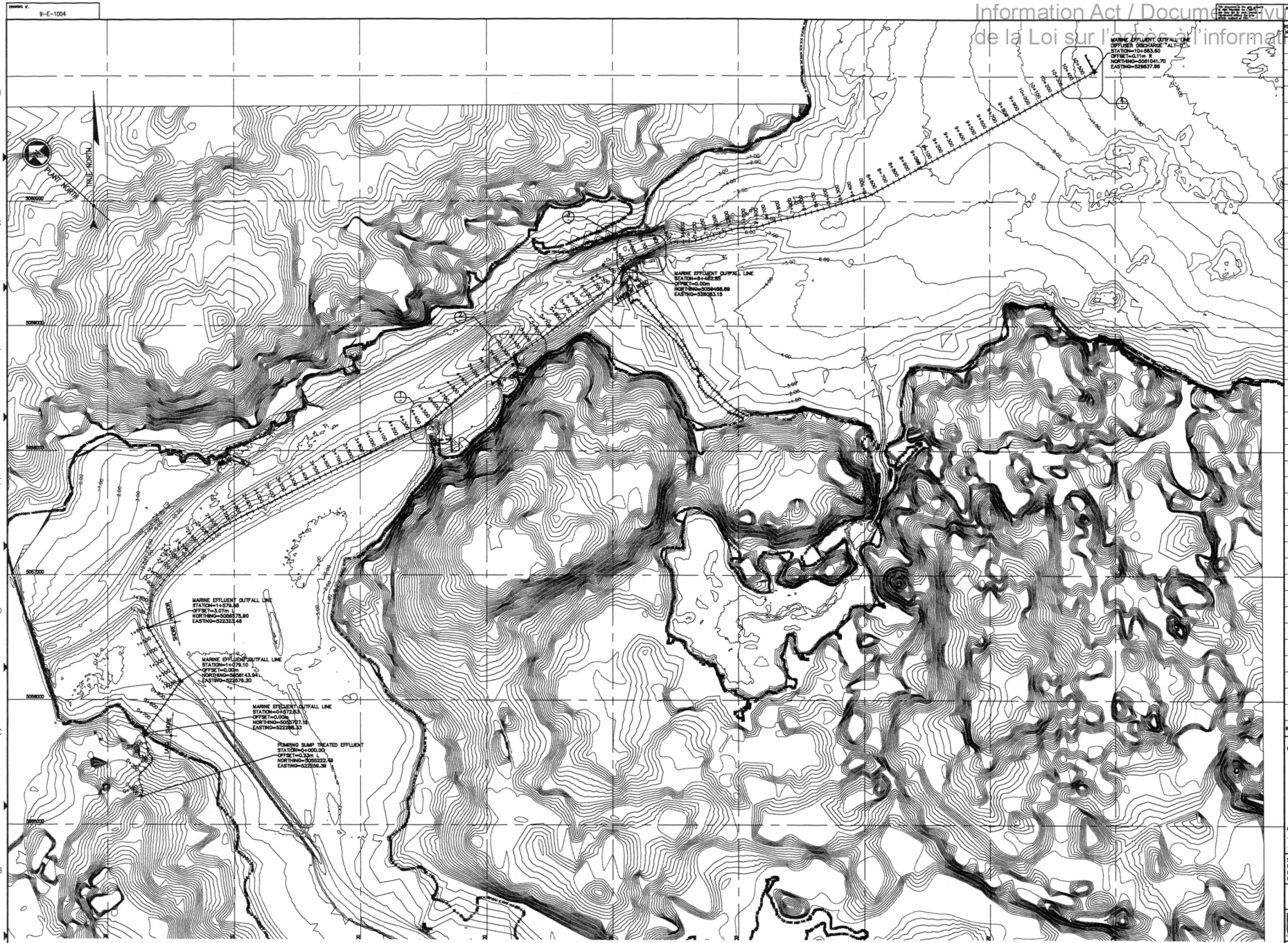
Avis de confidentialité:
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REF. DRAWING No.	NUMBER	REFERENCES

REV	APPROVAL	DATE	ISSUE STATUS
A	DA	14/06/17	ISSUED TO BOOKER'S FOR SUPPLEMENTARY INFORMATION

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EFFLUENT TREATMENT PLANT

CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING BATHYMETRY PLAN VIEW

PROJECT	DRAWING NUMBER	PAGE	REV.
111112A	9-E-1004	1	A

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CLIENT NUMBER: 000115

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APPROVAL	DATE	

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EFFLUENT TREATMENT PLANT

CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING BATHYMETRY PLAN VIEW

PROJECT	DRAWING NUMBER	PAGE	REV.
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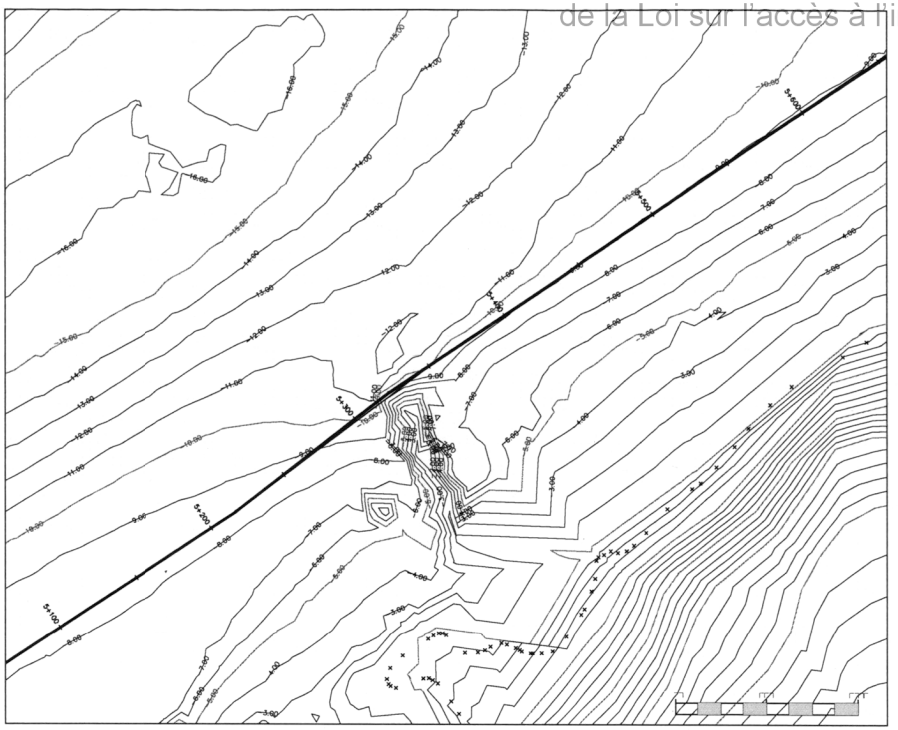
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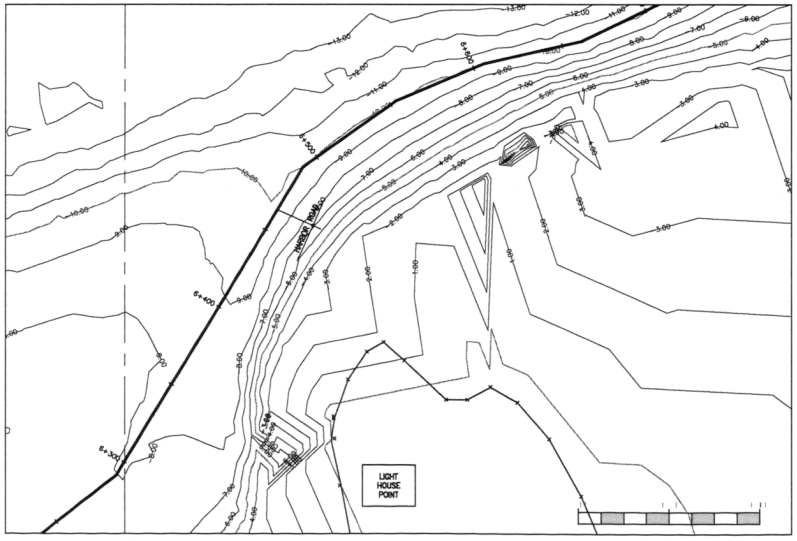
DRAWING N°. 9-E-1005



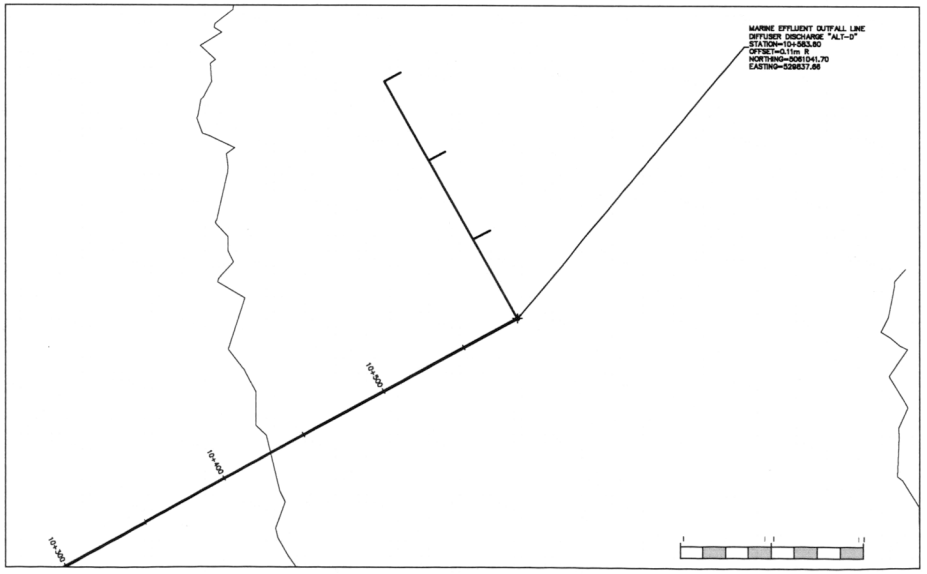
PICTOU HARBOR (NEAR MARINA) 1 / 1004
1:1000



PICTOU HARBOR (NEAR RIDGE) 2 / 1004
1:1000



END OF PICTOU HARBOR / START OF PICTOU ROAD 3 / 1004
1:1000



DIFFUSER DISCHARGE (ALT-D) 4 / 1004
1:1000

REF. DRAWING No.	NUMBER	REFERENCES

REV	APPROVAL	DATE	ISSUE STATUS
A	SA	14/06/17	ISSUED TO BIDDER'S FOR SUPPLEMENTARY INFORMATION

CERTIFIED FOR CONSTRUCTION
REV.: DATE:

APPROVAL
SIGNATURE DATE

SCALE:
DESIGNED: SA DATE: 09/JAN/2017
DRAWN: JFK DATE: 09/JAN/2017
CHECKED: SA DATE: 09/JAN/2017

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EFFLUENT TREATMENT PLANT

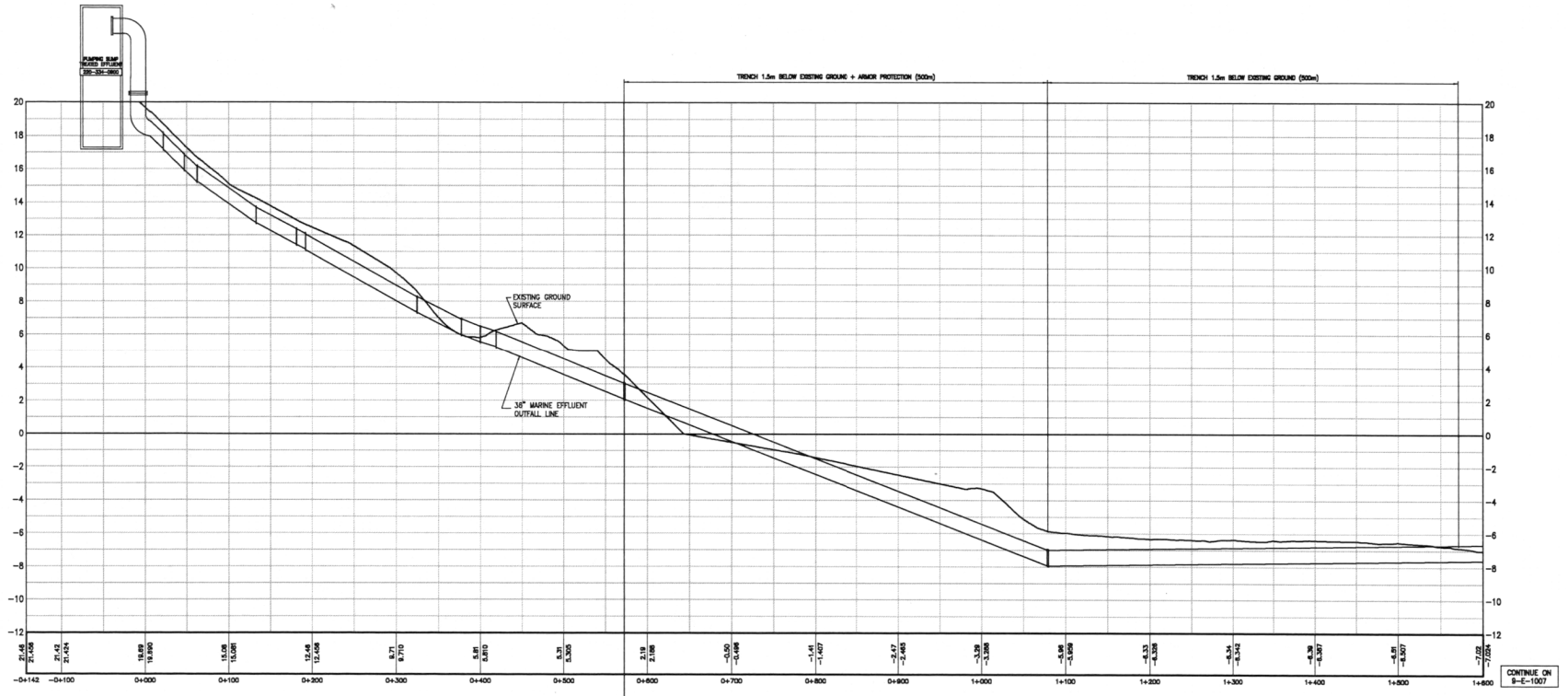
CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING AREAS OF INTEREST DETAILS

PROJECT	DRAWING NUMBER	PAGE	REV.
111112A	9-E-1005	1	A

TYPE

CLIENT NUMBER: 000117

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MARINE EFFLUENT OUTFALL LINE PROFILE (LAND) 575m

LAND PICTOU SHORE

MARINE EFFLUENT OUTFALL LINE PROFILE (SHORE) 1000m

NOTE:
LAND LENGTH 575m
SHORE LENGTH 1000m

REF. DRAWING No.	NUMBER	REFERENCES

REV	APPROVAL DATE	ISSUE STATUS
A	DA 14/06/17	ISSUED TO BOOKER'S FOR SUPPLEMENTARY INFORMATION

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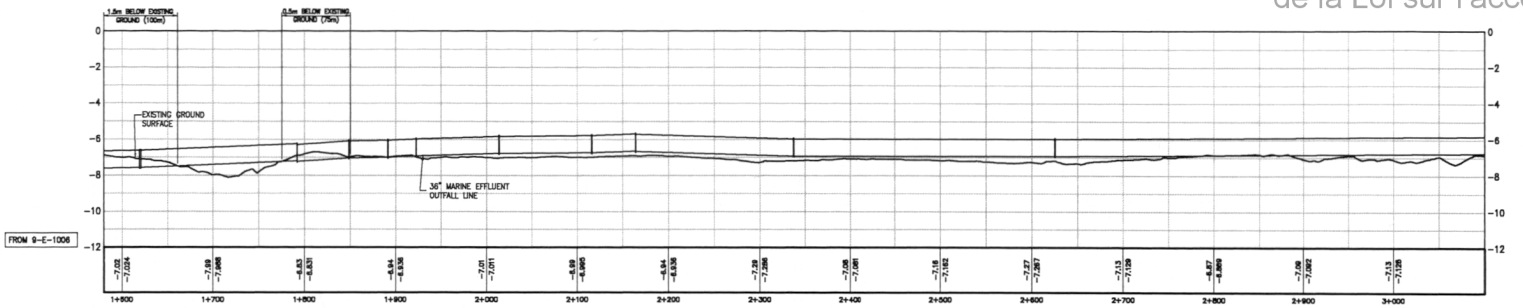
EFFLUENT TREATMENT PLANT

CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING SECTION LAND & SHORE

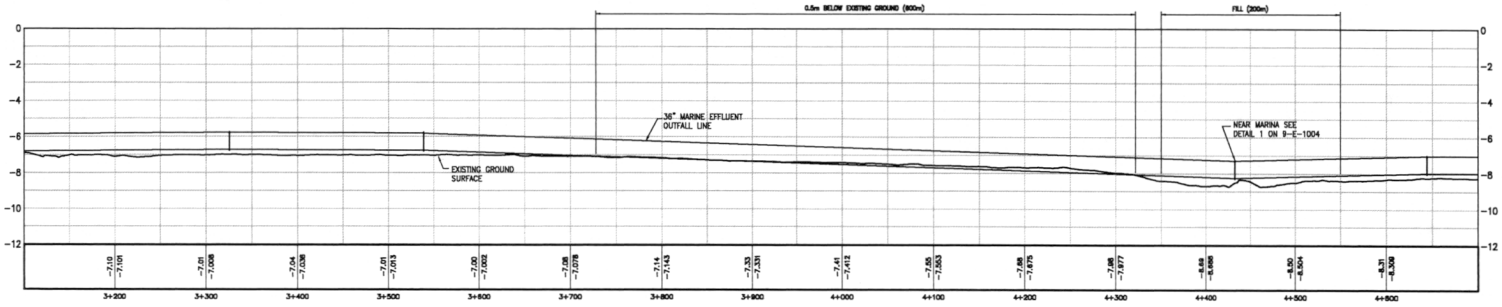
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TYPE
CLIENT NUMBER: 000118

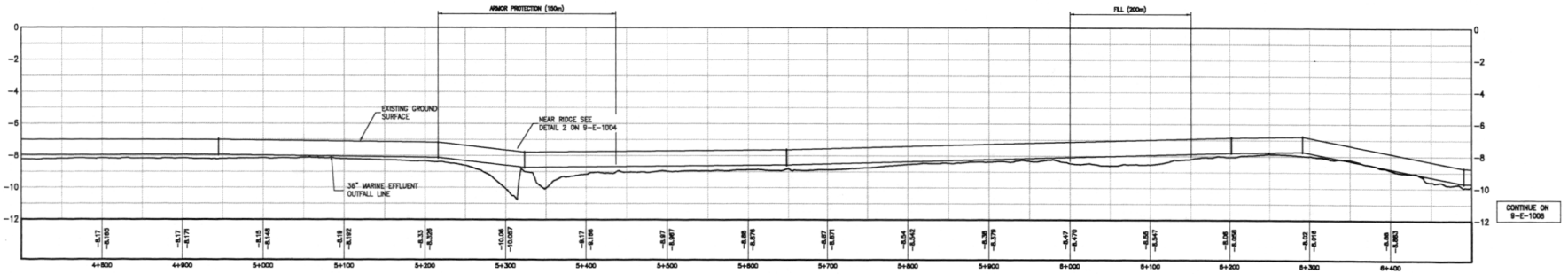
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MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU HARBOR)



MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU HARBOR)



MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU HARBOR)

NOTE:
PICTOU HARBOR LENGTH 4900m

REF. DRAWING No. NUMBER | REFERENCES

REV	APPROVAL DATE	ISSUE STATUS
A	16/06/17	ISSUED TO BIDDER'S FOR SUPPLEMENTARY INFORMATION

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REV.: DATE:

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EFFLUENT TREATMENT PLANT

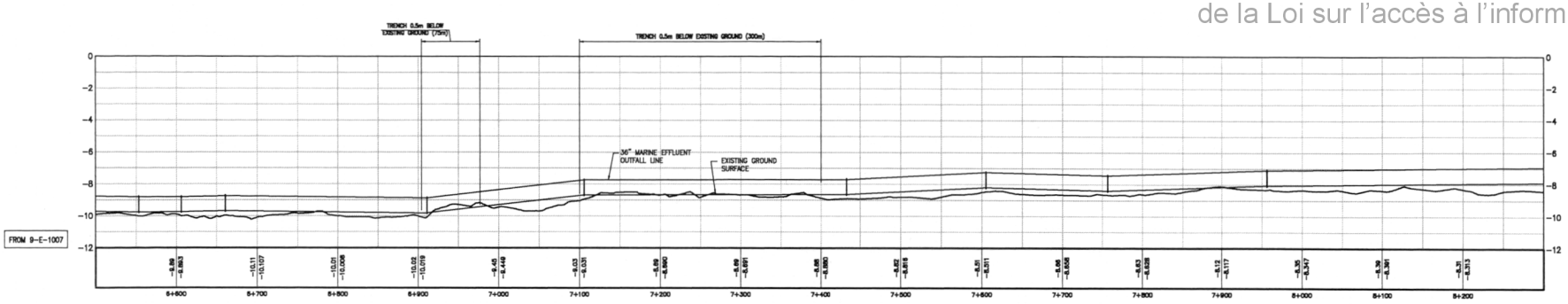
CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING SECTION PICTOU HARBOR

PROJECT	DRAWING NUMBER	PAGE	REV.
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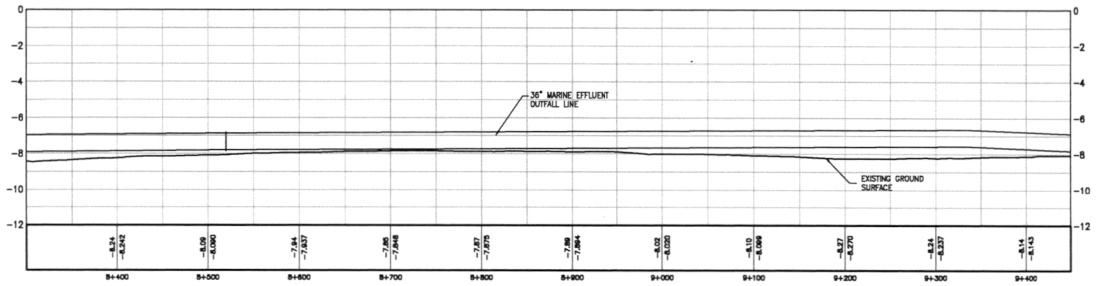
CLIENT NUMBER:

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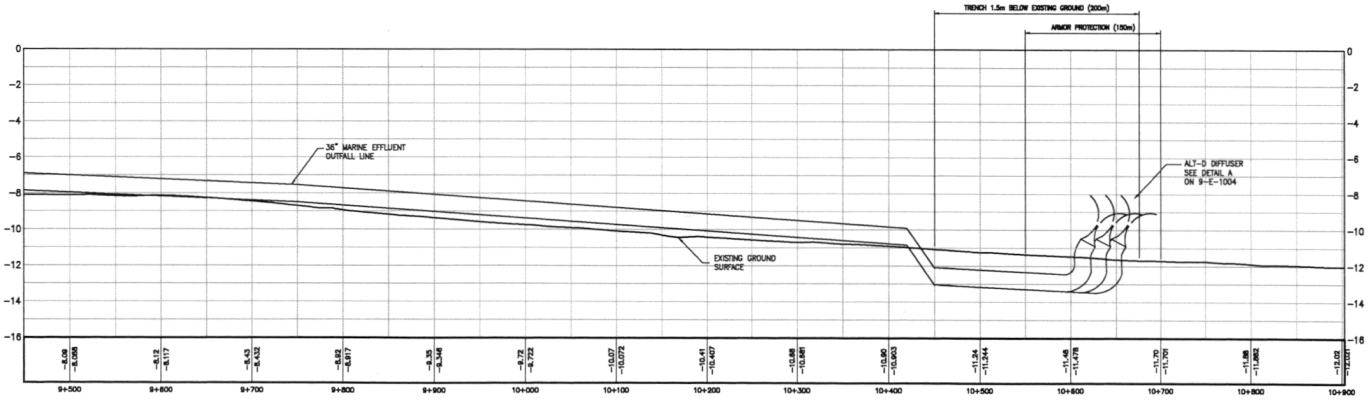
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MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU ROAD)



MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU ROAD)



MARINE EFFLUENT OUTFALL LINE PROFILE (PICTOU ROAD)

NOTE:
PICTOU ROAD LENGTH 4100m

REF. DRAWING No. / NUMBER	REFERENCES

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SCALE:
DESIGNED: DA DATE: 06/JAN/2017
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EFFLUENT TREATMENT PLANT

CONCEPTUAL MARINE EFFLUENT OUTFALL PIPELINE ROUTING SECTION PICTOU ROAD

PROJECT	DRAWING NUMBER	PAGE	REV.
111112A	9-E-1008	1	A

CLIENT NUMBER: 000120

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Jalloh, Rugi

From: Guy R. Martin <[redacted]
Sent: September-13-17 10:09 AM
To: Jalloh, Rugi
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

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Guy

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Guy R. Martin, ing
Conseiller Principal, Procédés et Environnement /
Principal Consultant, Process and Environment

KSH Consulting
1 Place Alexis Nihon
3400 de Maisonneuve O., bureau 1500
Montréal (Québec) Canada H3Z 3B8
T [redacted] **M** [redacted] **F** 514.939.5266

KSH

www.ksh.ca

From: Jalloh, Rugi [mailto:Rugi.Jalloh@dfo-mpo.gc.ca]
Sent: September-13-17 9:08 AM
To: Guy R. Martin
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

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Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
Fax/ téléc: 902-426-1489
1 Challenger Dr./1 promenade Challenger
P.O. Box/C.P. 1006, Station P410
Dartmouth, NS/NE B2Y 4A2

From: Guy R. Martin [redacted]
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To: Guy R. Martin
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

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From: Guy R. Martin [redacted]
Sent: August-09-17 9:40 PM

s.19(1)

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s.16(2)
s.19(1)

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Jalloh, Rugi

From: Guy R. Martin [redacted]
Sent: September-13-17 12:46 PM
To: Jalloh, Rugi
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

Hi Rugi,

Here are the instructions to access the file. Let me know if you have any issues with the file transfer.

Regards,

Guy

FTP INSTRUCTIONS

*** A few points to note when accessing an FTP:
- If you choose to use Internet Explorer to access the FTP, please clear out your internet cookies, temp files and history (close and restart your web browser to be sure the changes take effect – This link shows you how to clear your cache: http://www.wikihow.com/Clear-Your-Browser%27s-Cache)
- When you copy and paste the FTP Link in the address bar, make sure you did not copy and paste an extra space or character(s) at the beginning or end of the ftp address
- Verify with your IT team that the FTP is not being blocked either from a server filter or via the computer (proxy settings)

KSH FTP Instructions:
Open My Computer icon or Windows Explorer (not Internet Explorer)
Copy and Paste the following link in the Address Bar
[redacted]
Press Enter

If there is a prompt for username and/or password:

Username: [redacted]
Password:

.....
Guy R. Martin, ing
Conseiller Principal, Procédés et Environnement /
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KSH

s.16(2)
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www.ksh.ca

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Sent: September-13-17 9:28 AM
To: Guy R. Martin
Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)

Perfect!

Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
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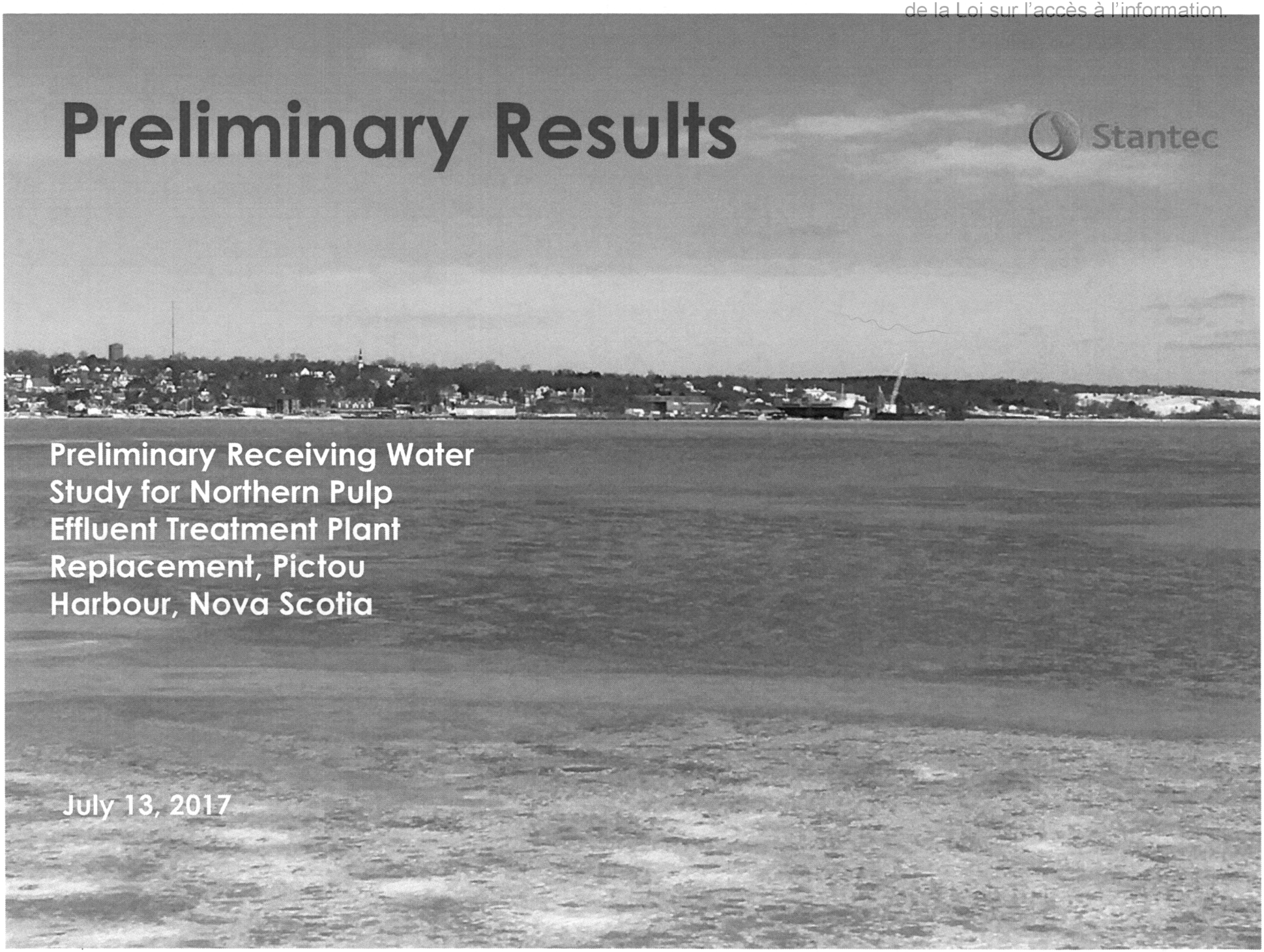
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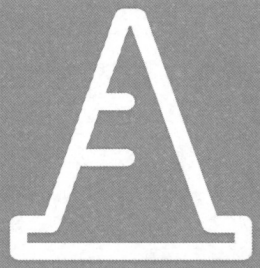
Preliminary Results

Stantec

Preliminary Receiving Water Study for Northern Pulp Effluent Treatment Plant Replacement, Pictou Harbour, Nova Scotia

July 13, 2017

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Safety Moment

Ladders – apparently No. 1 cause for visits to the ER!

Stantec

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Agenda

1 Introduction

2 2D Hydrodynamic Modelling and Outfall Selection

3 3D CORMIX Plume Modelling at Preferred Outfall

4 Engineering Considerations for Effluent Pipeline

Stantec

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1 Introduction

Northern Pulp's mill new outfall facility for wastewater treatment plant is to be located somewhere in Pictou Harbour, Nova Scotia (the Project).

Stantec

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2 Hydrodynamic and Effluent Dispersion Modelling

a. Objectives

b. Existing Available Data

c. Model Setup and Modelling Conditions

d. Effluent Dispersion Modeling Results

e. Conclusions

Stantec

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2a. Objectives

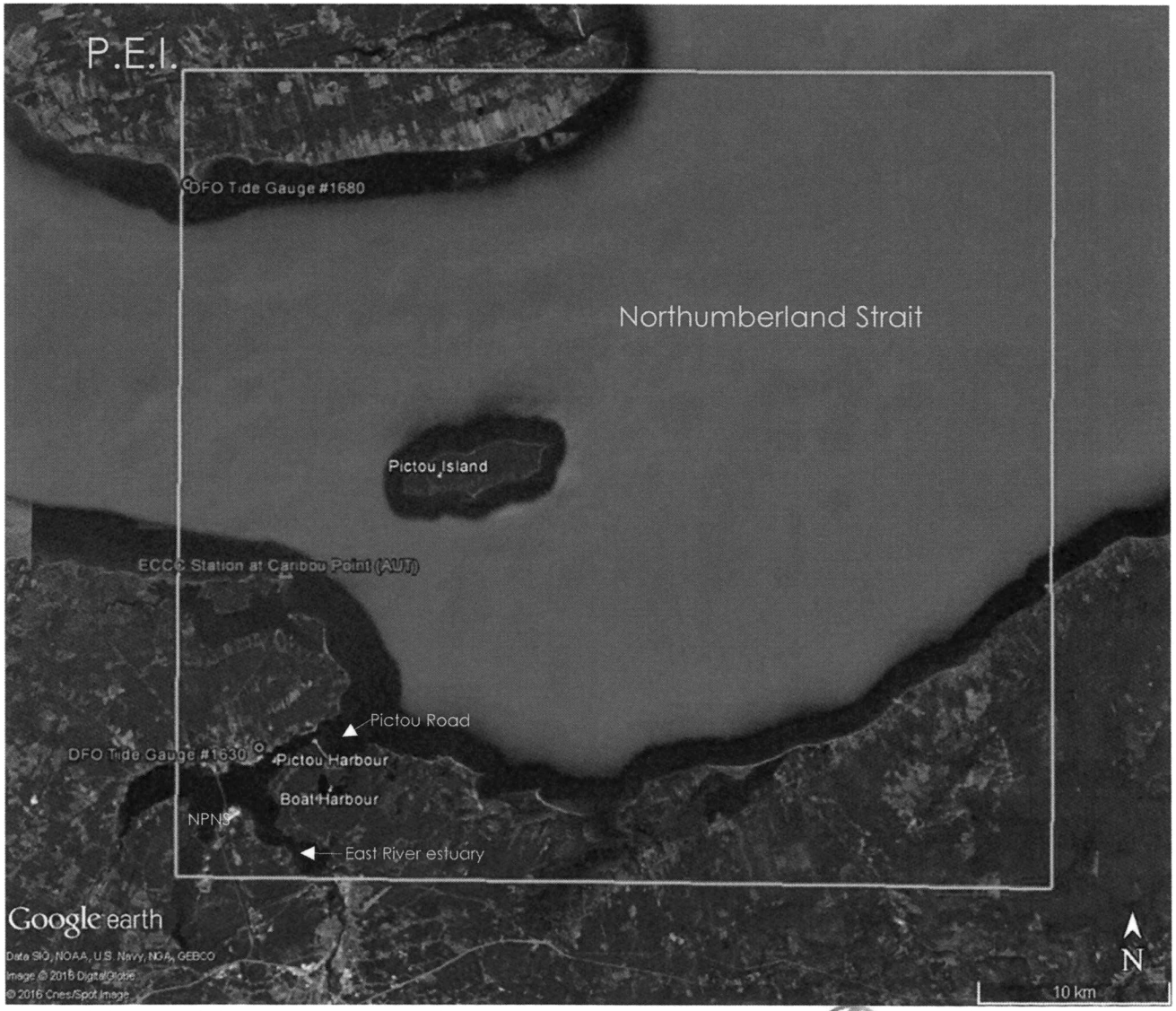
- Hydrodynamic modelling to understand the current characteristics and circulation patterns
- Effluent dispersion modelling to understand the far-field dispersion patterns, extent and dilution factors of discharged effluent
- To identify a preliminary end-of-pipe outfall location
- To provide hydrodynamic information required for CORMIX near-field dispersion modelling

Stantec

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Study Area

- East River estuary
- Pictou Harbour
- Pictou Road
- Boat Harbour
- Offshore open water of Northumberland Strait



Stantec

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2b. Existing Available Data

Key Data Sources

Parameter	Data Sources
Sea bed bathymetry	• Used Canadian Hydrographic Services (CHS) bathymetric survey conducted in 2015-2016 • CHS nautical charts • Boat Harbour bathymetric survey conducted by Canadian Seabed Research Ltd, in June, 2006 • Bathymetric and topographic survey conducted by Canadian Seabed Research Ltd, in 2009
Tides and currents	• DFO Canadian Tides and Water Levels • Historical current measurements conducted by DFO for period from February 22 to May 2, 1990
Winds	• Environment and Climate Change Canada (ECCC) Climate Archive, at climate station Caribou Point (AUT), NS
Marine water temperature and salinity	• Previous studies (ENSR, 1999)
River discharge	• Previous studies (ENSR, 1999)

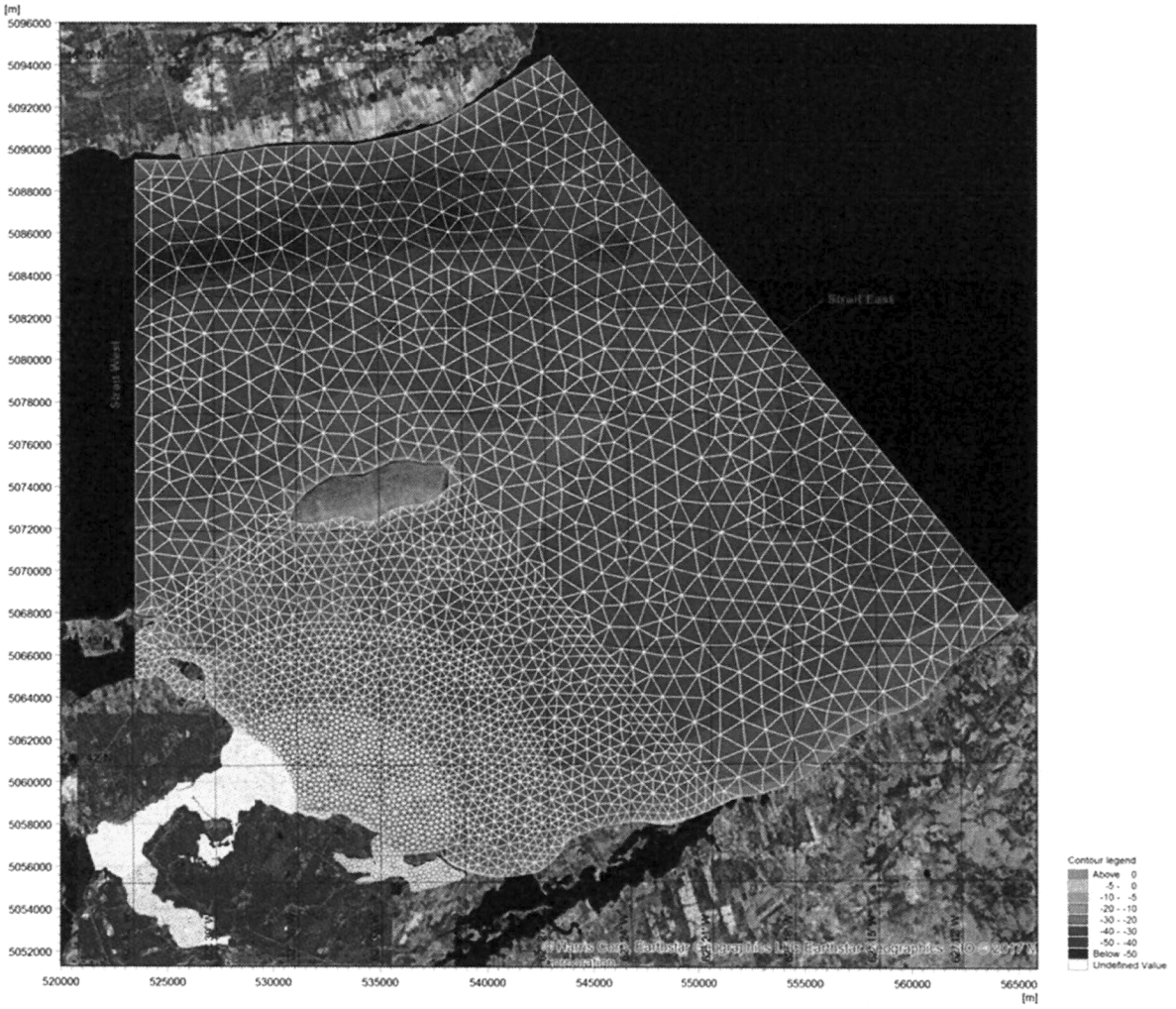
Stantec

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2c. Model Setup

Numerical Approach

- MIKE21 Coupled Model of Hydrodynamic (HD), Temperature/Salinity (TS), and Particle Tracking (PT) modules
- Triangle flexible mesh system with 8616 nodes and 15872 elements
- Offshore open water boundaries in Northumberland Strait and boundary at East River estuary



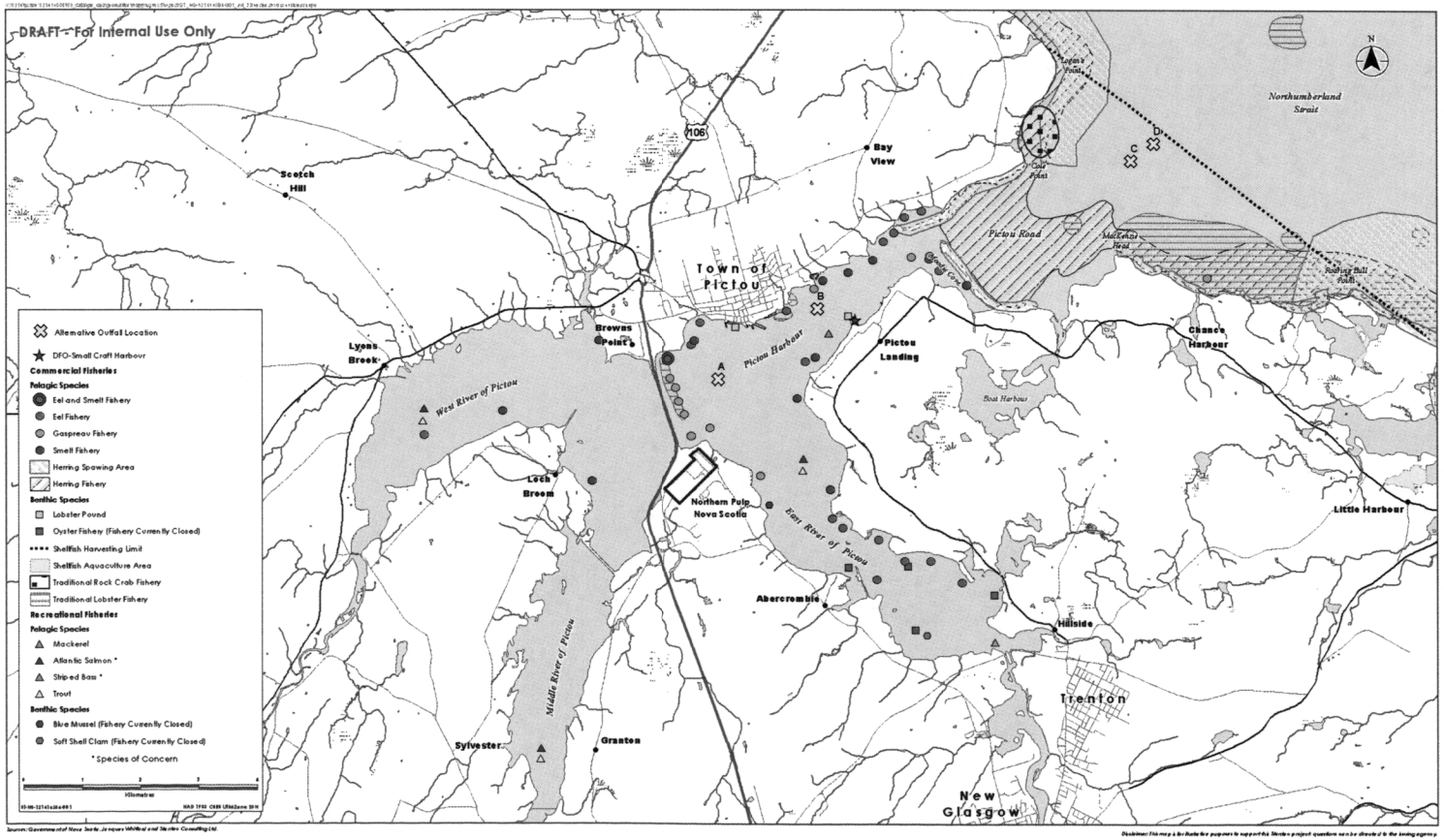
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2c. Modelling Conditions

Alternative Outfall Locations

- Not to be located within or in the proximity of sensitive environmental areas



Commercial, Recreational, and Aboriginal Fishery Sensitivities

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PRELIMINARY RECEIVING WATER STUDY – PICTOU HARBOUR, NOVA SCOTIA

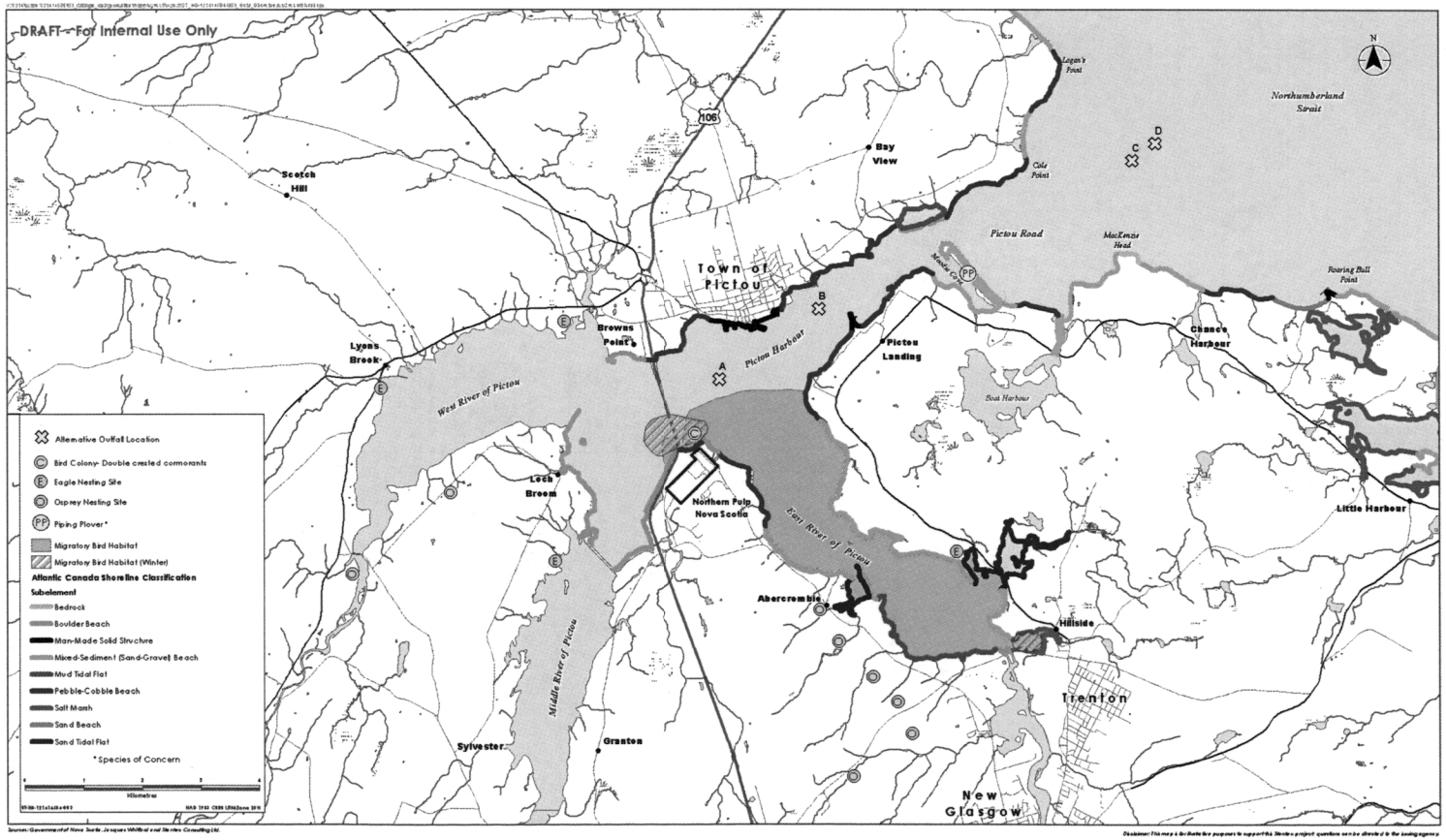
Figure 2-11

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2c. Modelling Conditions

Alternative Outfall Locations

- Not to be located within or in the proximity of sensitive environmental areas



Bird and Shoreline Sensitivities

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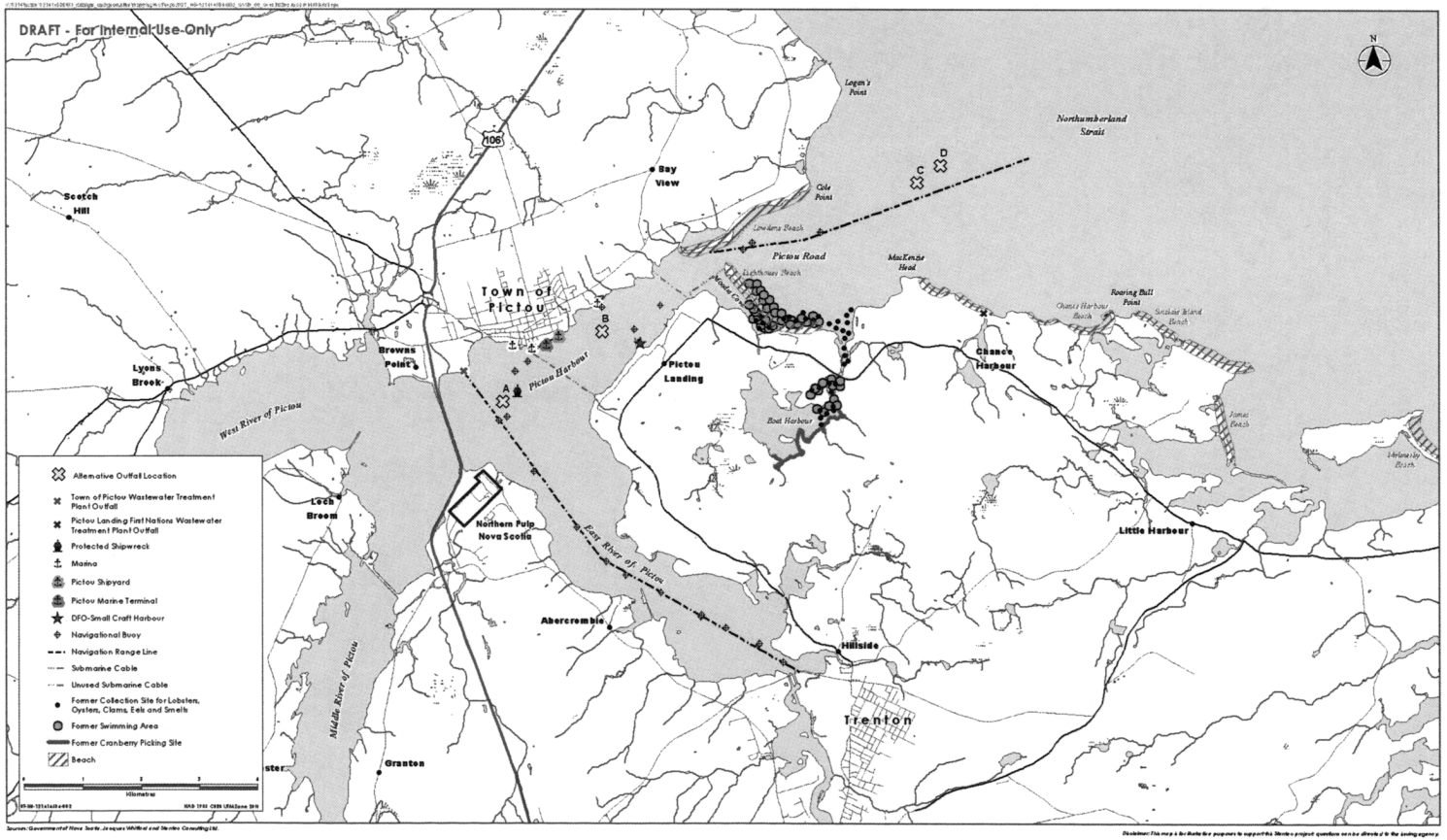
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2c. Modelling Conditions

Alternative Outfall Locations

- Not to be located within or in the proximity of sensitive socioeconomic areas



Other Socio-economic Sensitivities

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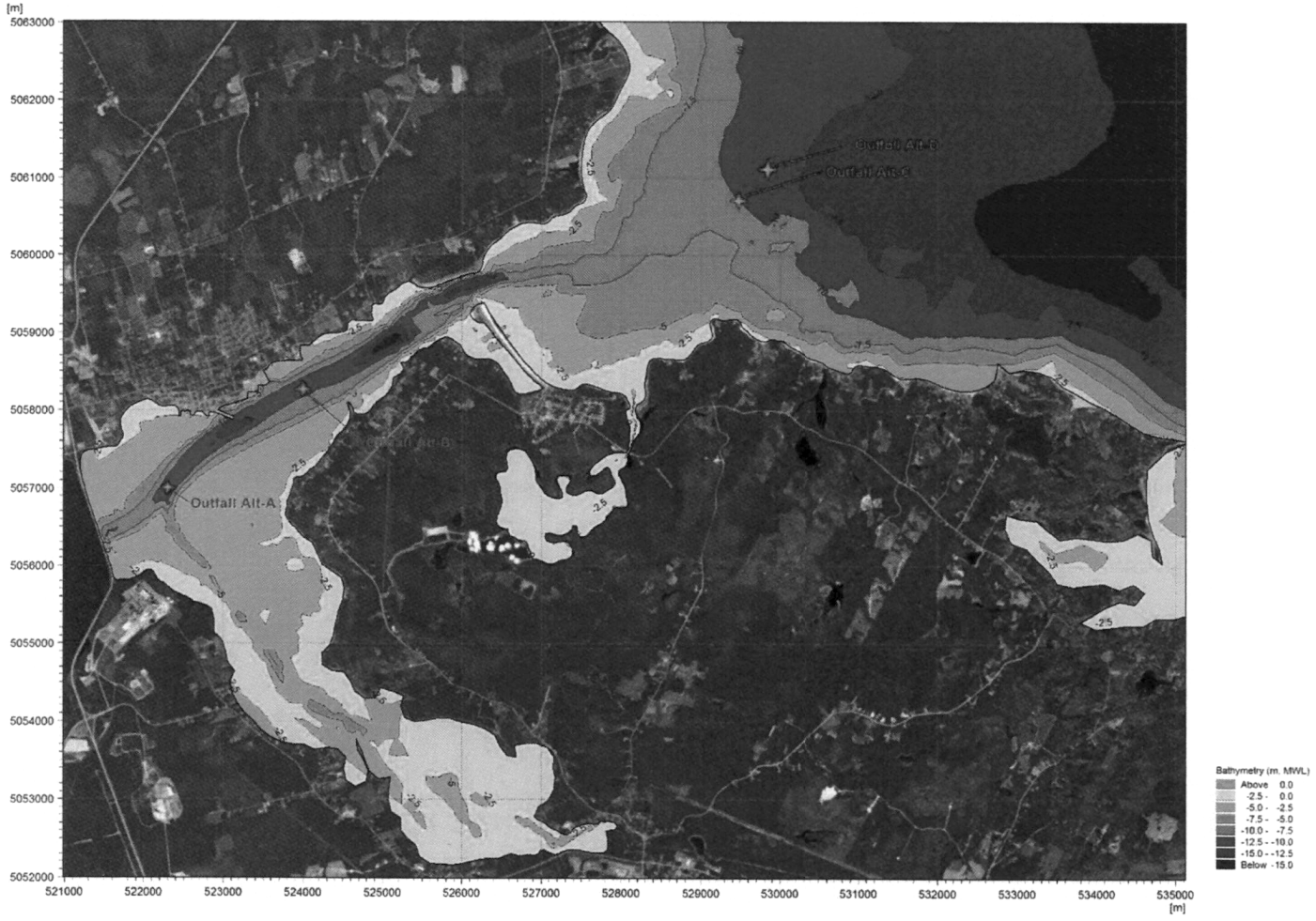
Figure 2-13

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2c. Modelling Conditions

Alternative Outfall Locations

- To be located at a water depth of 10 m MWL or deeper to provide allowance for ship navigation and outfall pipe/diffuser structures



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2c. Modelling Conditions

Modelling Scenarios and Conditions

A full month simulation period in July 2016, considering:

- Tidal cycles including spring and neap tides with less tide magnitude
- Calm winds, warm water and less river discharge during summer seasons

Summary of General Modelling Conditions

Feature	Characteristics	Comments
Outfall Discharge Location		
Alternative A (Alt-A)	Easting 522300 m, Northing 5057000 m	at a water depth 11.2 m MWL
Alternative B (Alt-B)	Easting 524000 m, Northing 5058220 m	at a water depth 10.8 m MWL
Alternative C (Alt-C)	Easting 529400 m, Northing 5060800 m	at a water depth 10.0 m MWL
Alternative D (Alt-D)	Easting 529800 m, Northing 5061100 m	at a water depth 11.3 m MWL
Effluent Properties		
Discharge Rate	0.984 m^3/s	daily max provided by KSH
Parameter	Temperature: 35 °C	Assumed maximum in July summer condition
	TDS: 4000 mg/L	based on information provided by KSH
	Arbitrary parameter concentration: 100 mg/L	assumed concentration at discharge
Boundary and Ambient Conditions		
Predicted Tides	Tidal range 1.91 m (from -1.11 m to 0.8 m) including spring and neap tides	This tidal range is less than the normal tidal range of 2.11 m in the Pictou Harbour area
Measured Winds	Peak and mean wind speeds in July 2016 are 10.83 m/s and 3.75 m/s respectively	Based on wind records at Caribou Point (AUT), NS
River Discharge	1.64 m^3/s	based on ENSR 1999 study
Ambient Water	Temperature: 14 °C	based on ENSR 1999 study
	Salinity: 27.5 psu	based on ENSR 1999 study

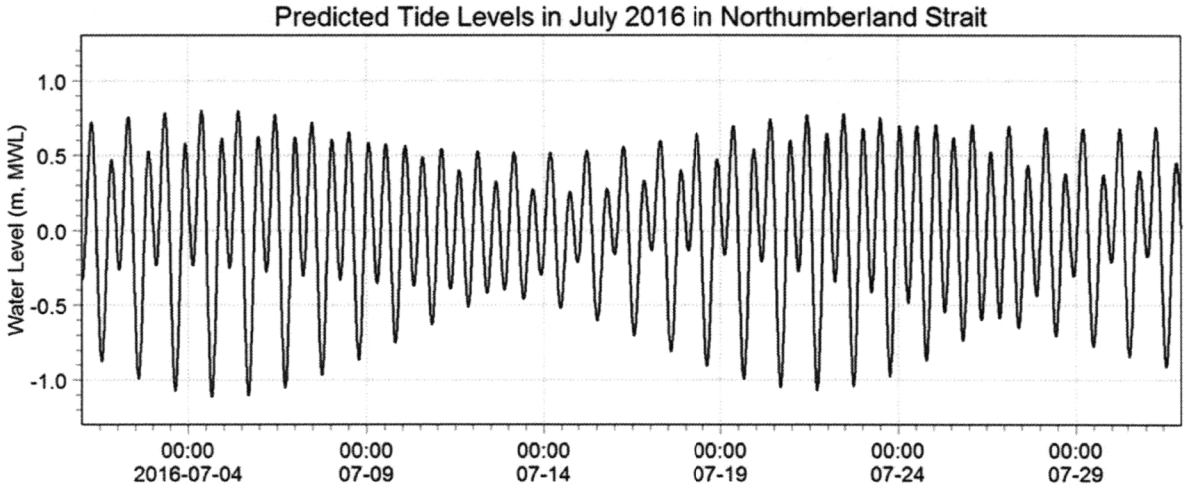
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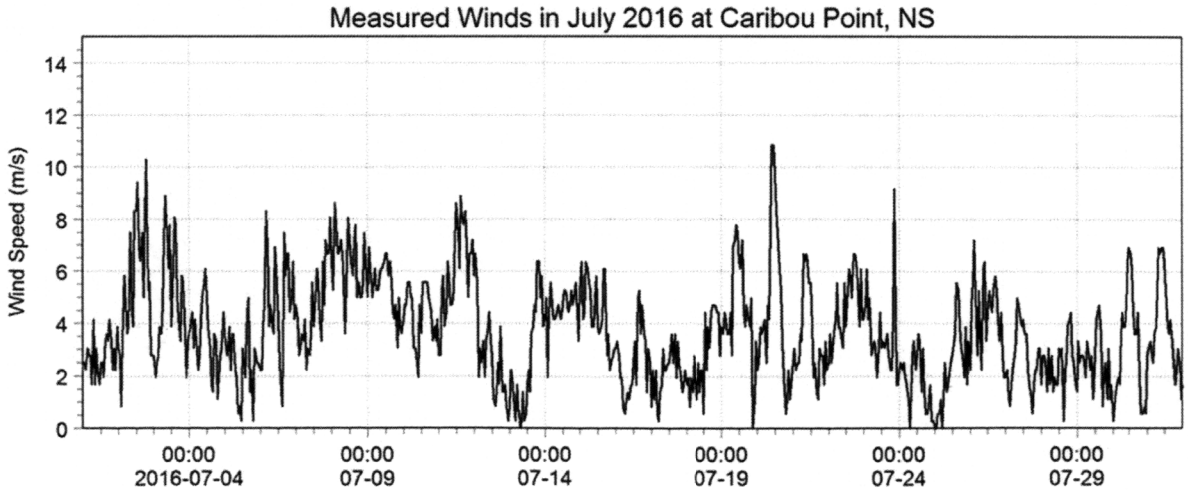
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2c. Modelling Conditions

Modelling Scenarios and Conditions

- Predicted tides and measured Winds in July 2016



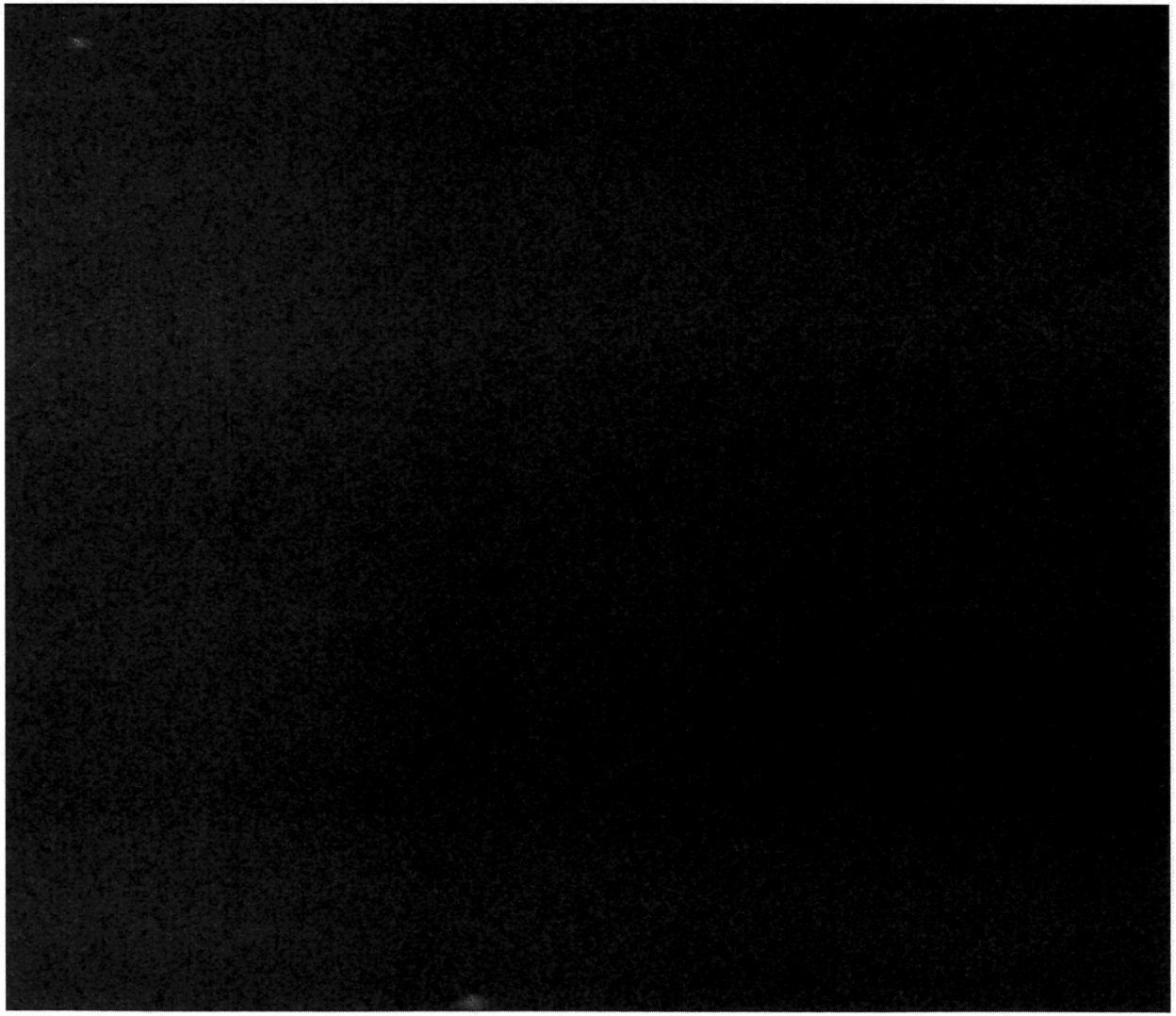


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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-A Outfall Location



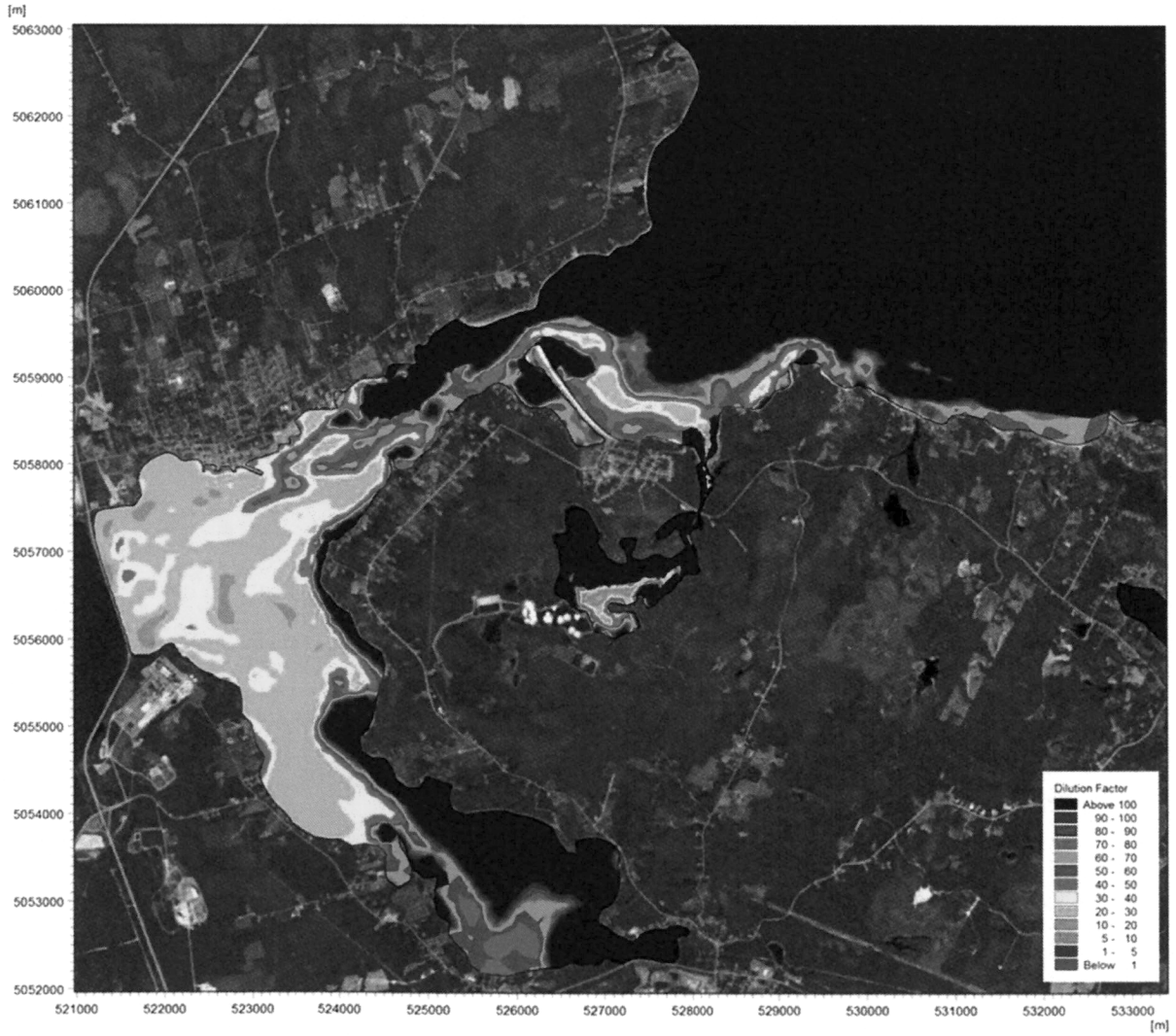
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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-A Outfall Location

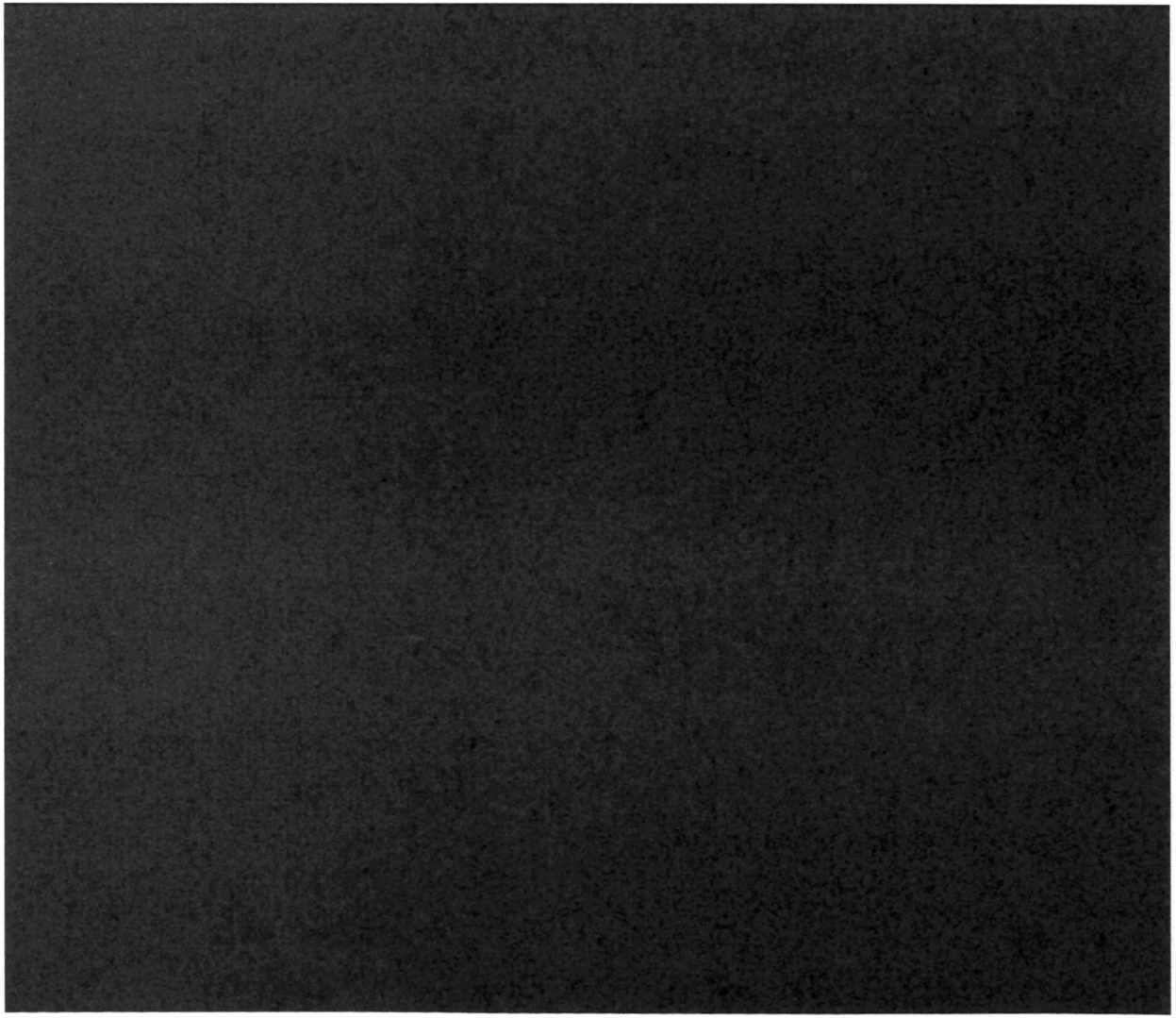
Spatial Distribution of Simulated Effluent Dilution Factor at Time by End of One Month Simulation Period



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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-B Outfall Location



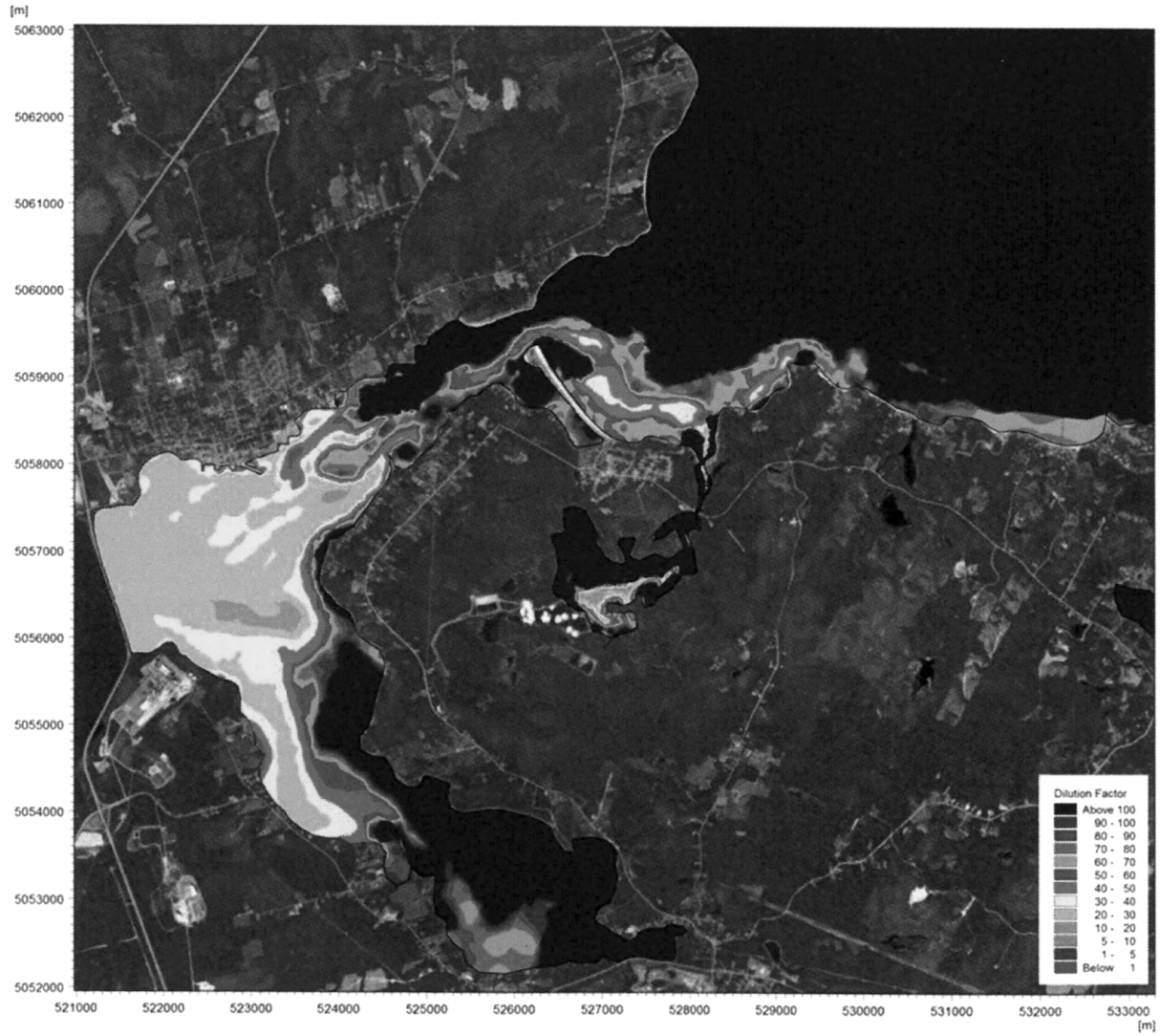
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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-B Outfall Location

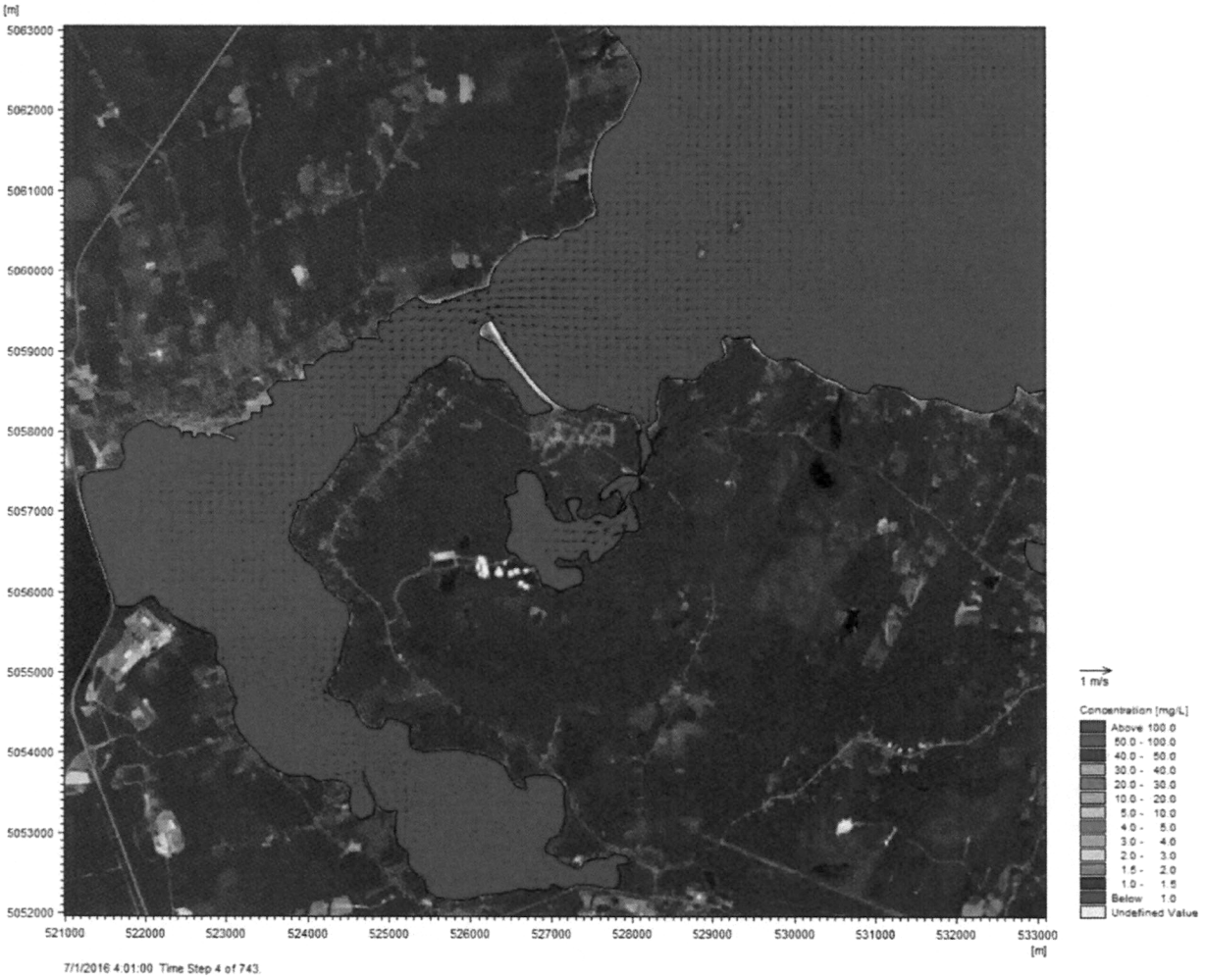
Spatial Distribution of Simulated Effluent Dilution Factor at Time by End of One Month Simulation Period



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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-C Outfall Location



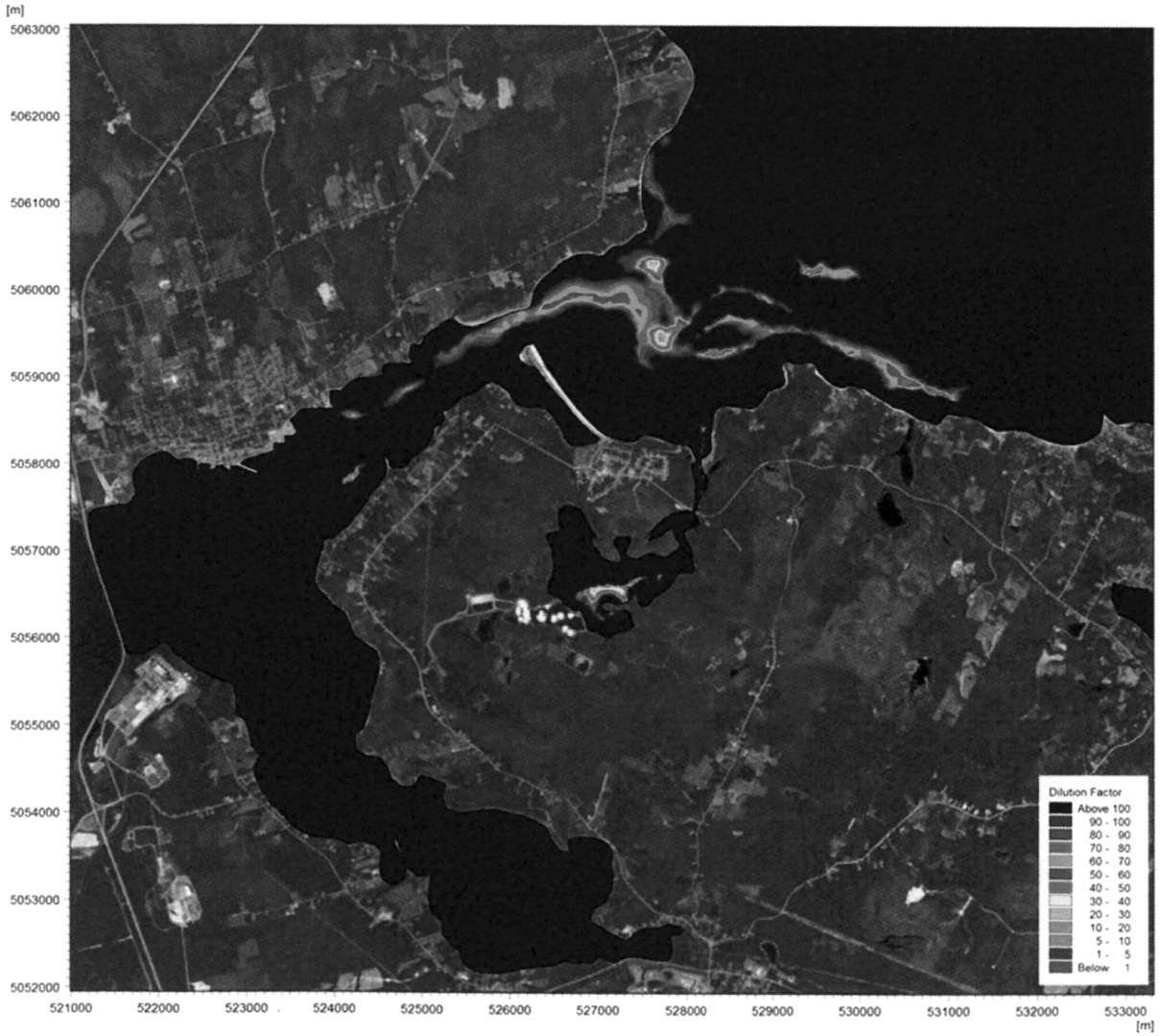
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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-C Outfall Location

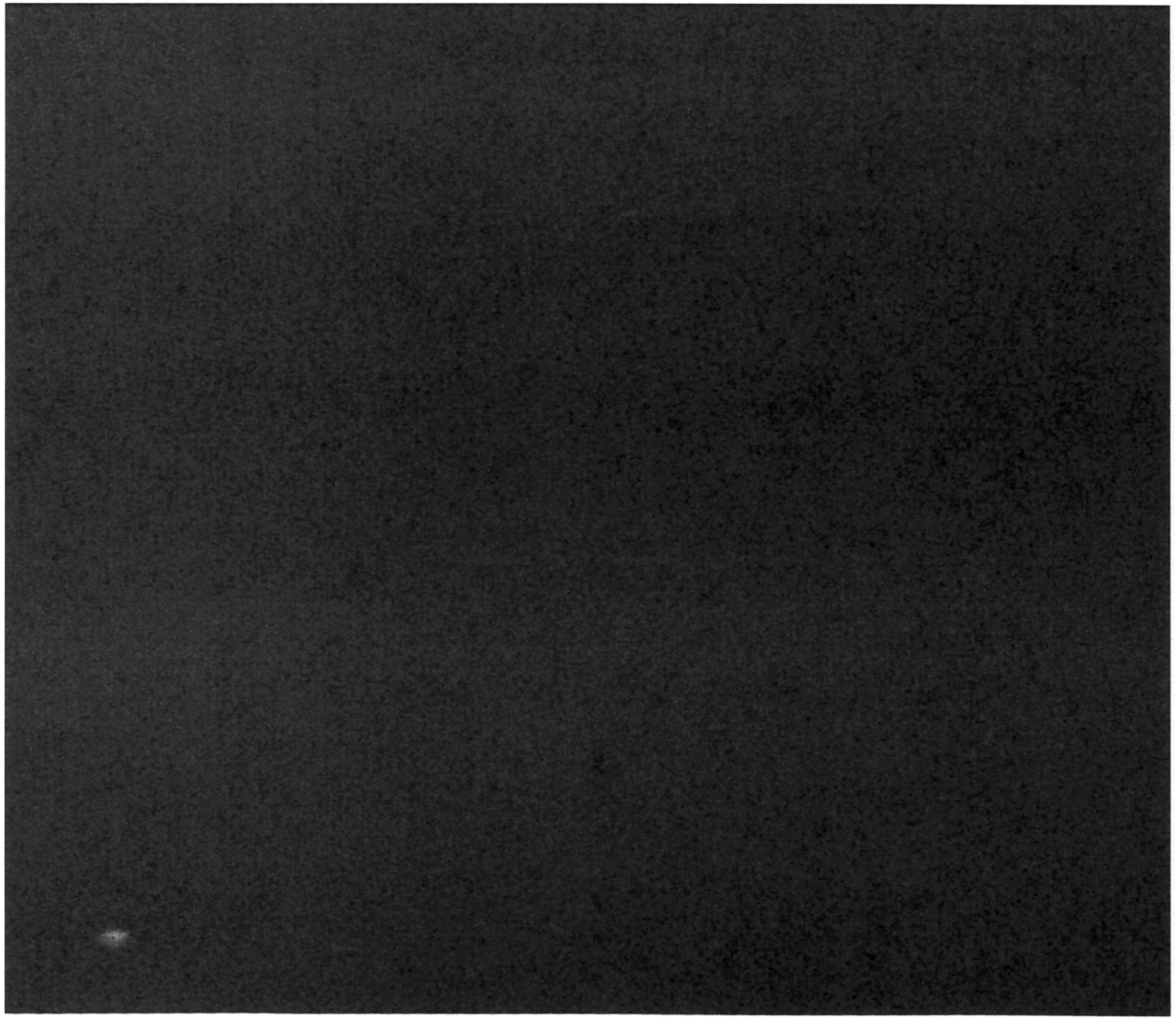
Spatial Distribution of Simulated Effluent Dilution Factor at Time by End of One Month Simulation Period



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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-D Outfall Location



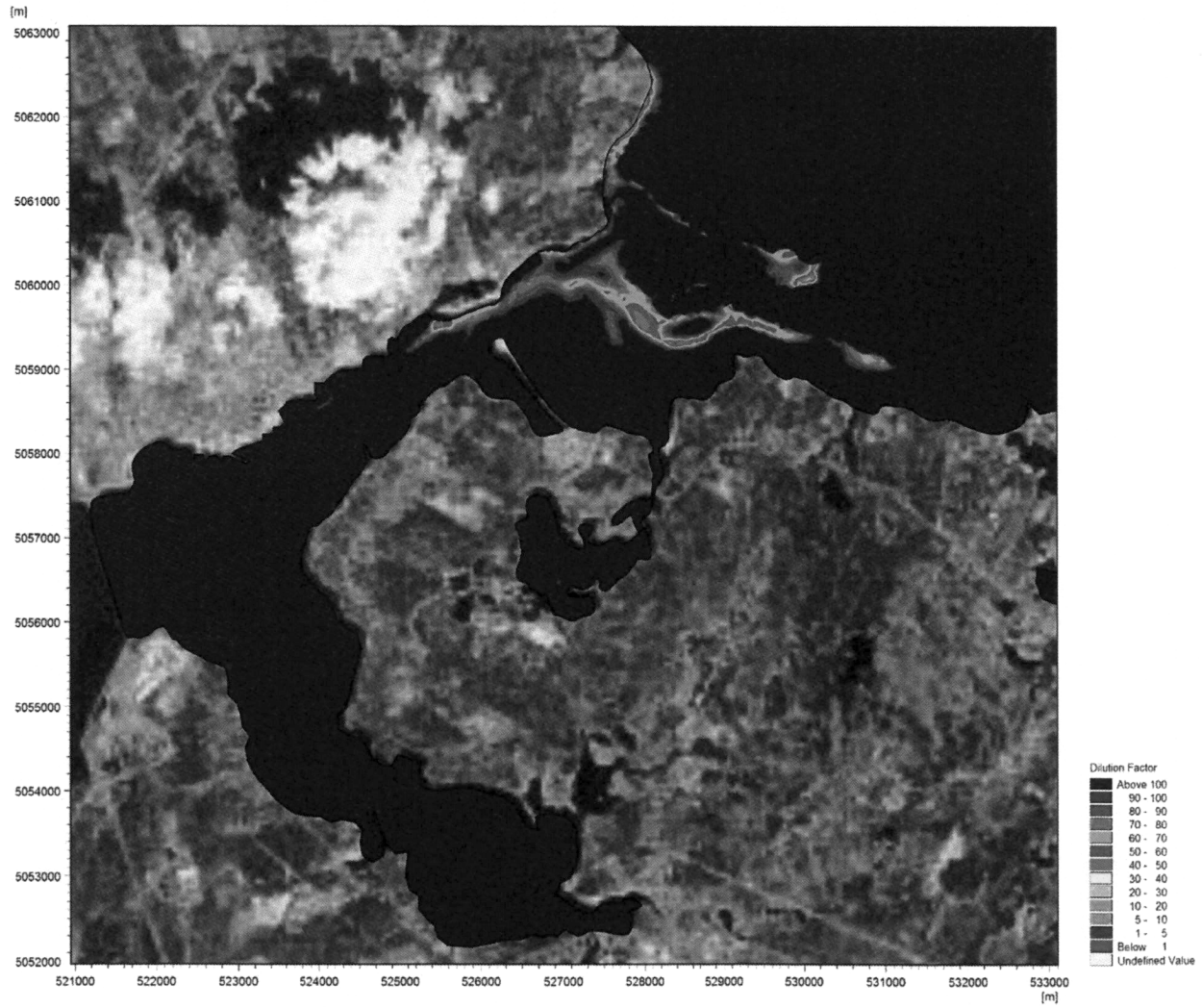
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2d. Modelling Results

Current Circulation and Effluent Dispersion for Discharge from Alternative-D Outfall Location

Spatial Distribution of Simulated Effluent Dilution Factor at Time by End of One Month Simulation Period



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2e. 2D Modelling Conclusions

Modelling results indicated that:

- Effluents discharged from outfalls within Pictou Harbour (i.e., **Alt-A** and **Alt-B** locations) would experience difficulty to be flushed out due to the effect of the Lighthouse Beach narrow at Pictou Harbour entrance. A large portion of discharged effluents would be retained within Pictou Harbour, resulting in cumulative increase of effluent concentrations under continuous long-term operation of treated water discharge.

- Effluents drifted out of Pictou Harbour move dynamically westerly by flood currents and easterly by ebb currents, and be circulated at eddies near the entrance of Boat Harbour. Eventually, part of the effluents would be transported by flood currents into Boat Harbour and the other part of the effluents would be transported by ebb currents northeasterly towards Mackenzie Head and further out into the open water of Northumberland Strait along the south coast (primarily noticeable for **Alt-A**, **Alt-B** and **Alt-C**).

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2e. 2D Modelling Conclusions (cont'd)

Modelling results indicated that:

- Among the four alternative outfall locations discussed in this study, **Alt-C** and **Alt-D** would have the least long-term and potential cumulative effects of effluent concentrations on the overall fishery and socioeconomic environments, and therefore are preferred outfall locations for treated water discharge.

- Only **Alt-D**, however, has no dispersion of effluent into Boat Harbour on the longer-term (i.e., 'backwash') and has higher potential for effluent dilution closer to the coast.

- Preliminary consensus is to select **Alt-D** as the preferred outfall location for effluent discharge based on 2D modelling results, even though **Alt-C** might be suitable.

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3 3D CORMIX Plume Modelling at Preferred Outfall Locations

a. Objectives

b. Model

c. Input Data

d. Results

e. Conclusions

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3a. Objectives

- Undertake preliminary effluent dispersion analysis of the effluent
- Evaluate compliance with applicable federal and provincial water quality guidelines of discharge operation of processed waste water under conservative ambient conditions
- Investigate and optimize various outfall configurations and operational conditions to reduce the environmental impact
- Use modelling results in evaluation of effluent discharge to meet regulatory mixing zone (RMZ) requirements.

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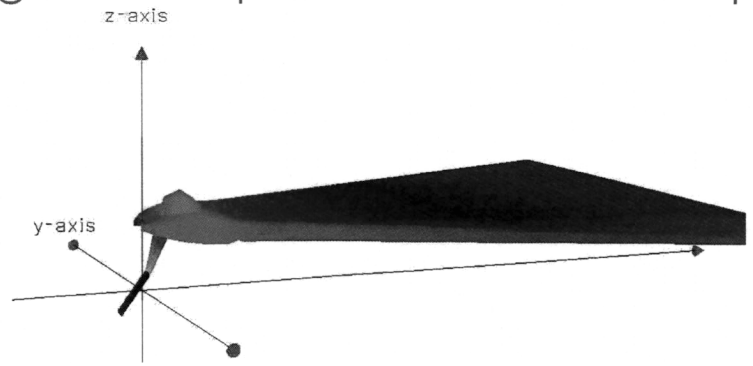
3b. Model

- Cornell Mixing Zone Expert System (CORMIX, Version 10.0) is a mixing zone model and decision support system for environmental impact assessment of regulatory mixing zones resulting from point-source discharges

- CORMIX is a USEPA-supported methodology for simulation of turbulent buoyant jet mixing behavior which covers a majority of common discharge and environmental conditions

- CORMIX classifies momentum and buoyancy of the discharge in relation to boundary interactions (flow surface or bottom contact) to accurately predict mixing behavior

- CORMIX gives interactive 3-D visualization of the plume and regulatory mixing zone requirements for water quality parameters.



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3c. Input Data for Alt-C

Ambient and Effluent Conditions

Parameters	Value	Comments
Wastewater Flow Rate, L/s	0.984 m^3/s	Daily maximum flow (KSH)
Water Depth at Outfall	9.9 m	Bathymetry map
Average depth in mixing zone	10 m	Bathymetry map
Ambient Velocity	0.007 m/s (min) 0.06 m/s (average) 0.14 m/s (max)	MIKE21 modeling results
Manning's n	0.02	Assumed bottom roughness
Ambient Water Density	1020.43 kg/m^3	Assumed average ambient summer temperature 14° C and salinity 27.5 psu (ENSR 1999)
Effluent Temperature	37°C	Assumed daily maximum in August - September
Wind speed	5.3 m/s	Caribou Point Climate Station (ID 8200774). Average of hourly data for 2016

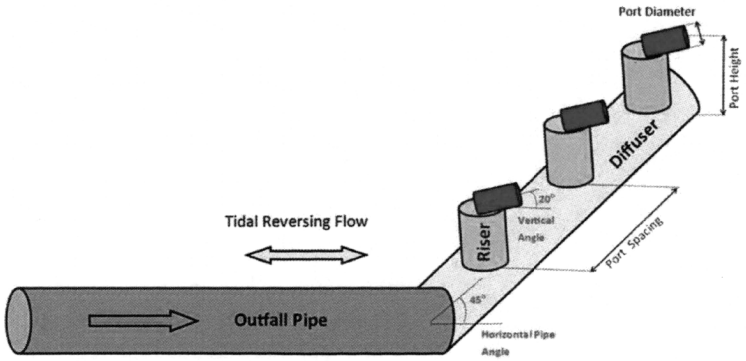
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3c. Input Data for Alt-C

Scenario for Outfall Diffusers

	Scenario 1: Single (One) Port	Scenario 2: Three Ports	Scenario 3: Six Ports	Scenario 4: Six Ports with Reduced Flow
Port Opening, m^2	0.4	0.3	0.2	0.2
Number of Ports	1	3	6	6
Vertical Pipe Angle (theta), degree	20	20	20	20
Horizontal Pipe Angle (sigma), degree	315	315	315	315
Alignment Angle (gamma), degree	45	45	45	45
Relative Orientation Angle (beta), degree	n/a	90	90	90
Port Height Above Seabed, m	1.0	1.0	1.0	1.0
Wastewater Flow Rate, m^3/s	0.98	0.98	0.98	0.87
Water Depth at Outfall, m	10	10	10	10
Average Depth in Mixing Zone, m	10	10	10	10



Schematic Representation of 3 Ports Diffuser

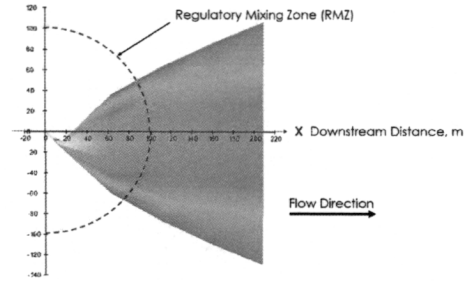
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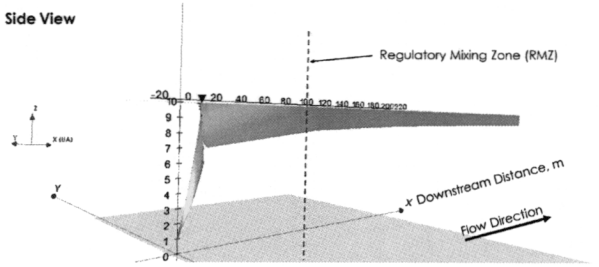
3d. Results: Atl-C

Scenario 1: Single Port

Plan View

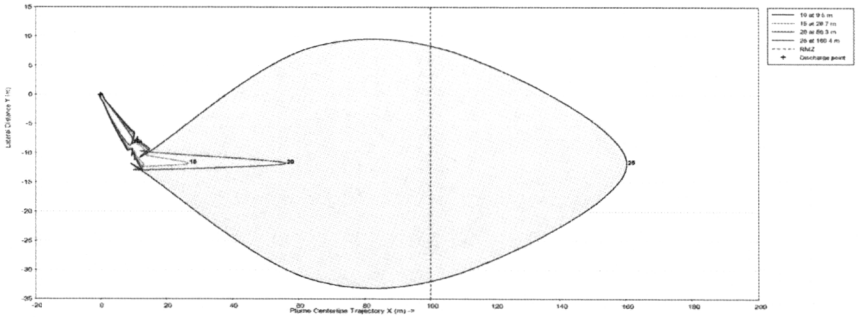


Side View

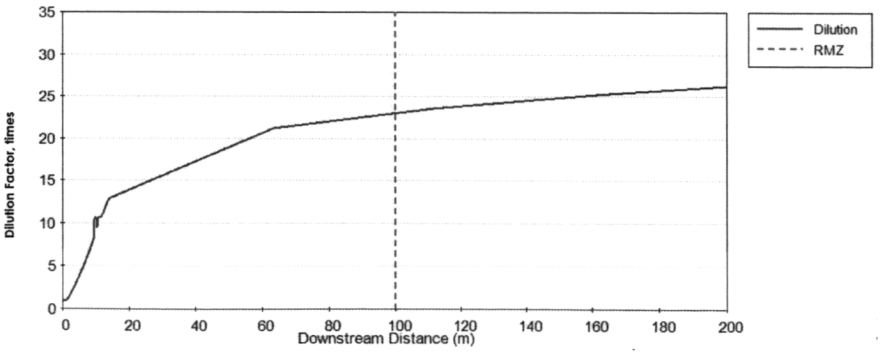


Effluent Concentration (mg/L)

Dilution Isolines



Dilution vs Downstream Distance

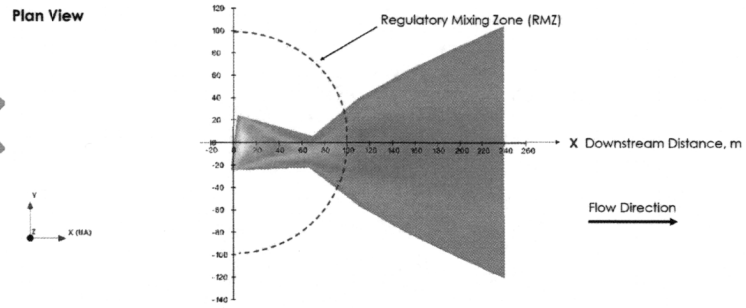


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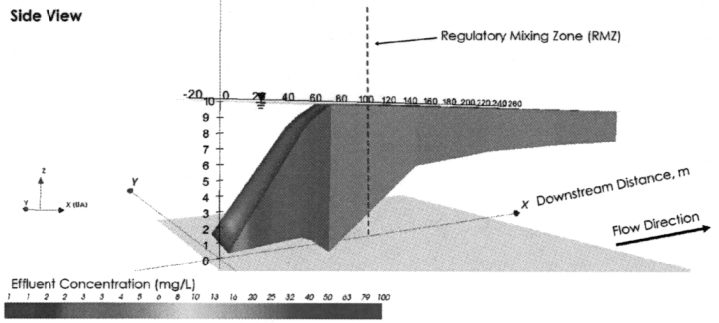
3d. Results: Alt-C

Scenario 2: 3-ports Discharge

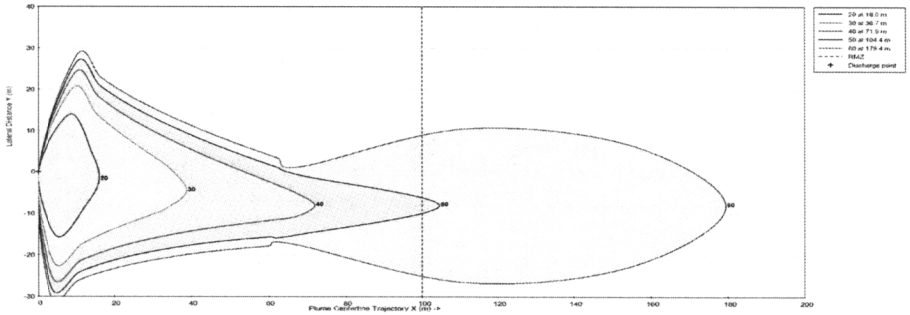
Plan View



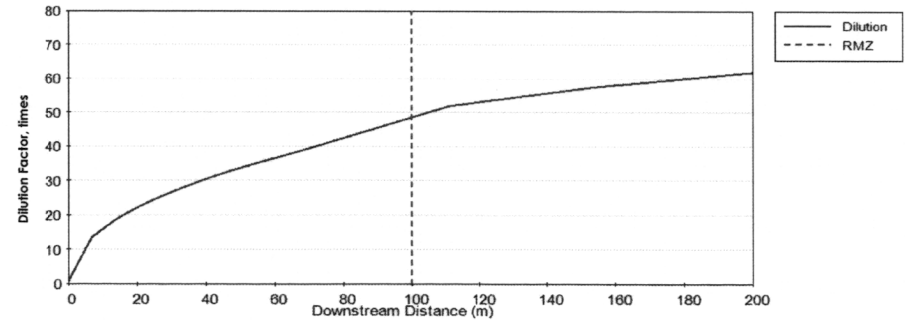
Side View



Dilution Isolines



Dilution vs Downstream Distance

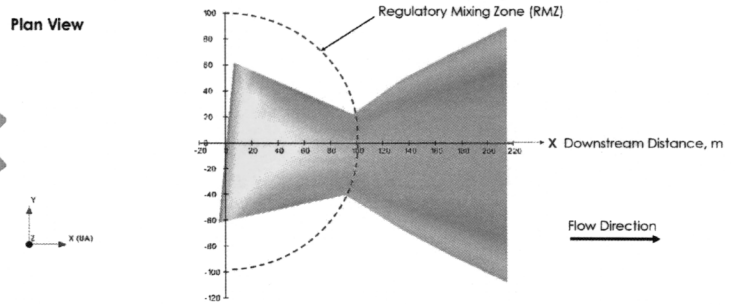


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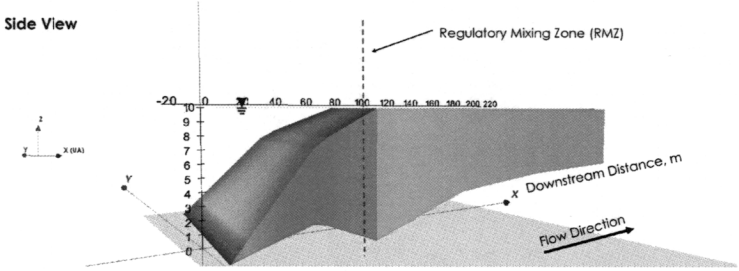
3d. Results: Alt-C

Scenario 3: 6-ports Diffuser

Plan View

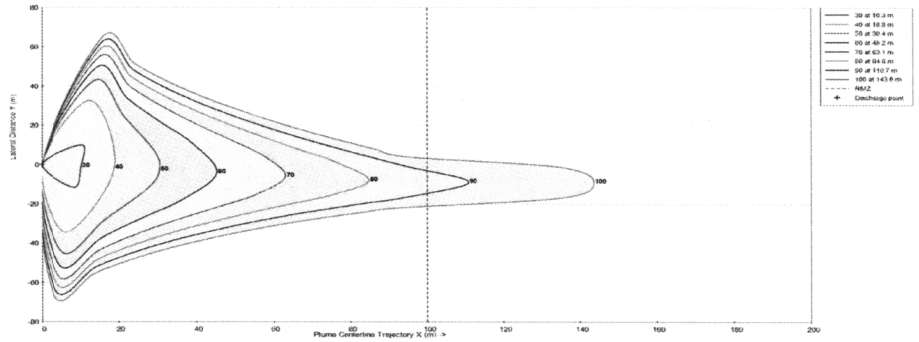


Side View

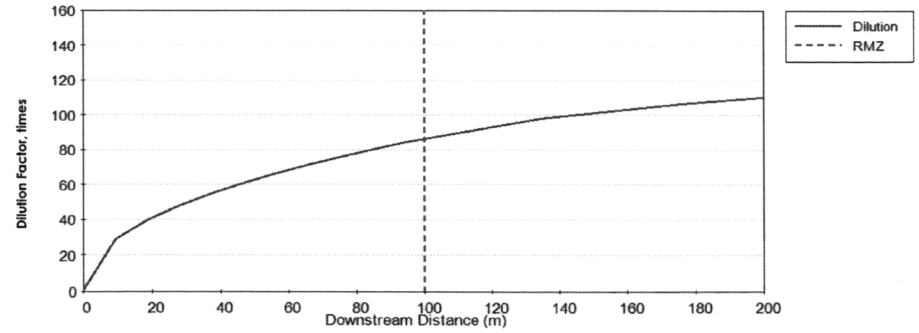


Effluent Concentration (mg/L)

Dilution Isolines



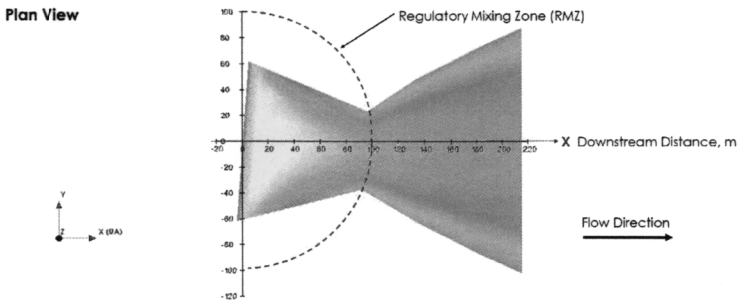
Dilution vs Downstream Distance

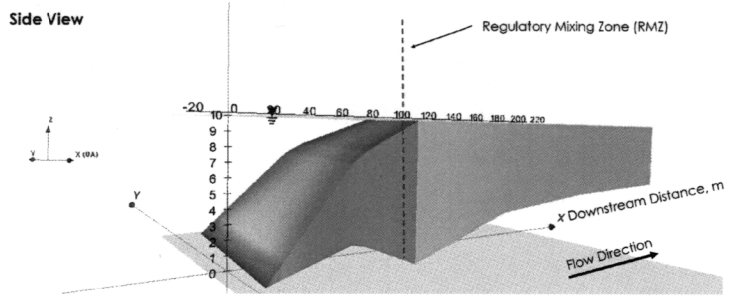


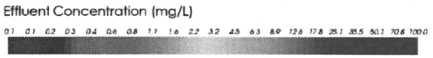
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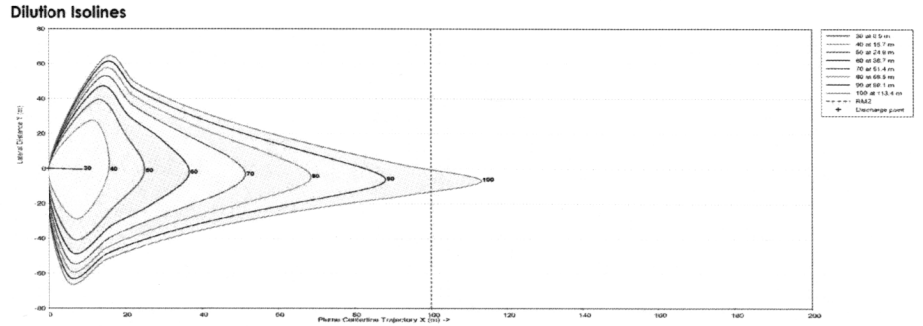
3d. Results: Alt-C

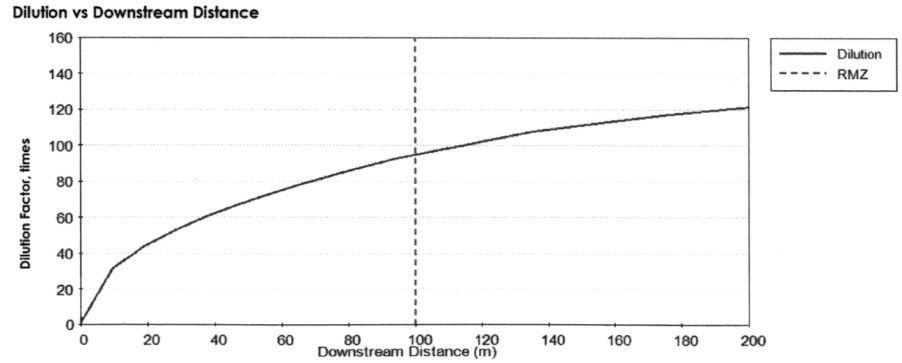
Scenario 3: 6-ports Diffuser (reduced flow)











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3d. Results: Alt-C

Dilution Factor within Mixing Zone

Scenario	Distance from Diffuser and Dilution Ratio					
	5 m	10 m	20 m	50 m	100 m	200 m
Scenario 1 - Single Port Diffuser	4.1	8.9	14.1	19.0	23.5	25.9
Scenario 2 - Three Ports Diffuser	12.3	14.9	19.8	32.8	49.0	64.0
Scenario 3 - Six Ports Diffuser	29.6	33.5	41.1	61.4	86.0	110.9
Scenario 4 - Six Ports Diffuser with Reduced Effluent Flow	32.5	36.8	45.1	67.5	96.3	122.1

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3d. Results: Alt-C

Water Quality at the End of the Mixing Zone for a 6-port Diffuser

Parameter	Unit	Effluent Daily Maximum	CCME, Marine Guideline	Ambient Conditions	End of Mixing Zone at 100 m from Diffuser
Adsorbable Organic Halides (AOX)	mg/L	7.8	n/a	Trace amount	0.09
Total Nitrogen (TN)	mg/L	3.0	45[1]	0.24	0.24
Total Phosphorus (TP)	mg/L	1.5	n/a	0.35	0.35
Colour	TCU	750	n/a	10.8	10.8
Chemical Oxygen Demand (COD)	mg/L	725	n/a	n/a	8.4
Biochemical Oxygen Demand (BOD_5)	mg/L	48	n/a	n/a	0.6
Total Suspended Solids (TSS)	mg/L	48	Narrative [2]	8.5	8.5
Dissolved Oxygen	mg/L	> 1.5	>8	7.2	7.2
pH	-	7.0 - 8.5	7.0 - 8.7	8.0	7.0 - 8.5
Temperature (summer)	°C	37	Narrative [3]	17.6 (Summer) 0 (Winter)	17.9 (Summer) 0.3 (Winter)

n/a – not available
[1] - CCME marine limit for NO_3^- as N
[2] - Maximum average increase of 5 mg/L from background levels for longer-term exposures (e.g., inputs lasting between 24 h and 30 d)
[3] - Human activities should not cause changes in ambient temperature of marine and estuarine water to exceed ±1°C at any time, location, or depth

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3e. Conclusions for Alt-C

- Regulatory mixing zone (RMZ) of 100 m was used, which is the maximum accepted distance by CCME
- Conservative effluent flow and ambient conditions were used
- Scenario with 6 ports discharge shows the best dilution around the diffuser at Alt-C

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CORMIX Input Data for Alt-D

Diffuser Design and Scenarios

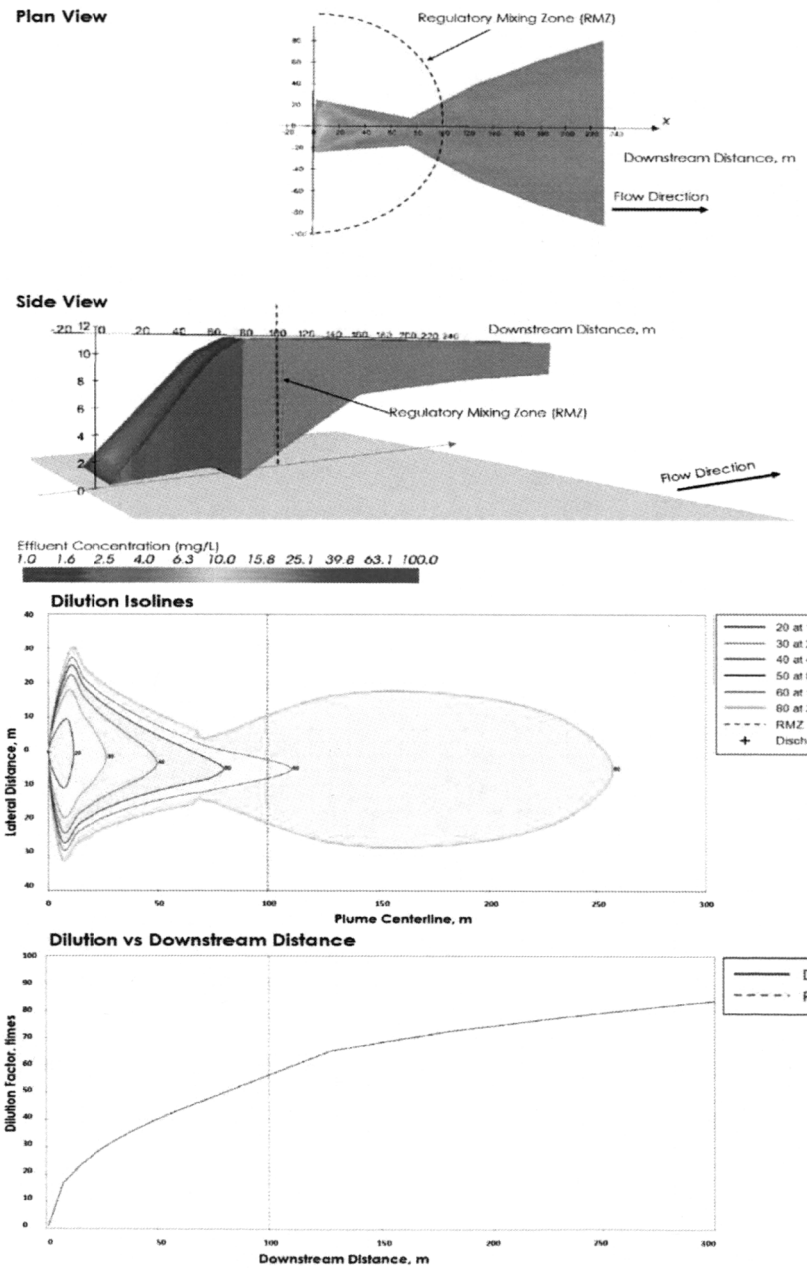
	Scenario 1: Three Ports	Scenario 2: Six Ports
Port Opening, m^2	0.3	0.2
Number of Ports	3	6
Vertical Pipe Angle (theta), degree	20	20
Horizontal Pipe Angle (sigma), degree	315	315
Alignment Angle (gamma), degree	45	45
Relative Orientation Angle (beta), degree	90	90
Port Height Above Seabed, m	1.0	1.0
Daily Maximum Wastewater Flow Rate, m^3/s	0.98	0.98
Water Depth at Outfall, m	11.3	11.3
Average Depth in Mixing Zone, m	12	12
Ambient Velocity at Tidal Conditions, m/s	Max=0.17 Average=0.053 Min=0.009	Max=0.17 Average=0.053 Min=0.009
Manning's n	0.02	0.02
Ambient Water Density, kg/m^3	1020.43	1020.43
Effluent Density, kg/m^3	996.32	996.32
Average Wind Speed, m/s	5.3	5.3

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Results: Atl-D

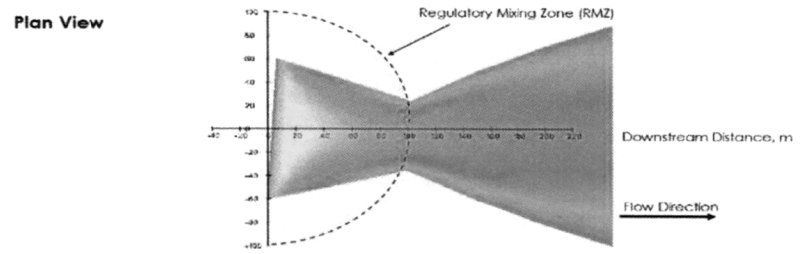
Scenario 1: 3-Port Discharge

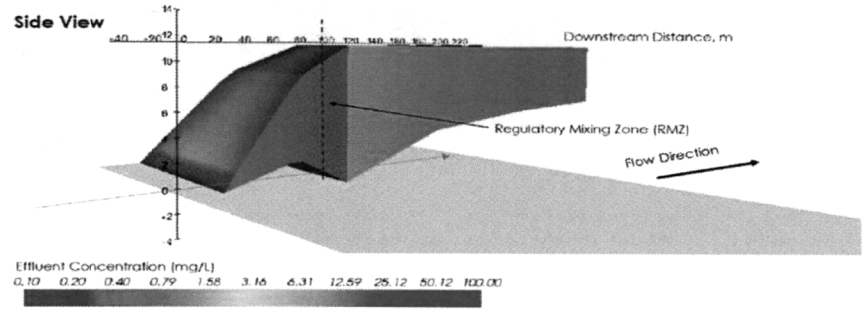


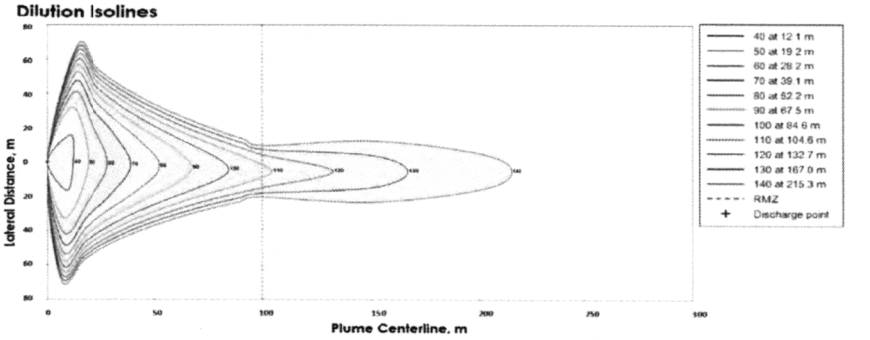
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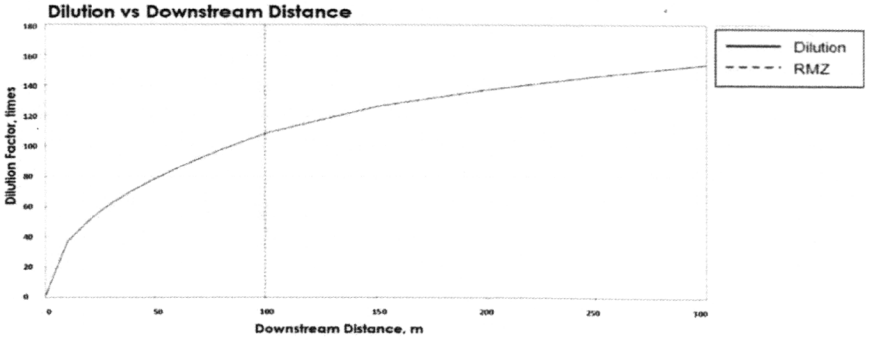
Results: Atl-D

Scenario 2: 6-Port Discharge









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Near-field Results: Alt-D

Dilution Factor within Mixing Zone

Scenario	Distance from Diffuser and Dilution Ratio					
	5 m	10 m	20 m	50 m	100 m	200 m
Scenario 1 - Three Ports Diffuser	18.1	20.8	25.8	39.5	57.6	75.9
Scenario 2 - Six Ports Diffuser	36.3	41.3	50.9	76.7	109.3	135.8

Recall Results for Alt-C:

Scenario	Distance from Diffuser and Dilution Ratio					
	5 m	10 m	20 m	50 m	100 m	200 m
Scenario 2 - Three Ports Diffuser	12.3	14.9	19.8	32.8	49.0	64.0
Scenario 3 - Six Ports Diffuser	29.6	33.5	41.1	61.4	86.0	110.9
Scenario 4 - Six Ports Diffuser with Reduced Effluent Flow	32.5	36.8	45.1	67.5	96.3	122.1

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Near-Field Results: Alt-D compared to Alt-C

Water Quality at the End of the Mixing Zone for a 6-port Diffuser

Parameter	Unit	Effluent Daily Maximum	CCME, Marine Guideline	Ambient Conditions	Alt-C End of Mixing Zone at 100 m from Diffuser	Alt-D End of Mixing Zone at 100 m from Diffuser
Adsorbable Organic Halides (AOX)	mg/L	7.8	n/a	Trace amount	0.09	0.07
Total Nitrogen (TN)	mg/L	3.0	45[1]	0.24	0.24	0.24
Total Phosphorus (TP)	mg/L	1.5	n/a	0.35	0.35	0.35
Colour	TCU	750	n/a	10.8	10.8	10.8
Chemical Oxygen Demand (COD)	mg/L	725	n/a	n/a	8.4	6.6
Biochemical Oxygen Demand (BOD_5)	mg/L	48	n/a	n/a	0.6	0.4
Total Suspended Solids (TSS)	mg/L	48	Narrative [2]	8.5	8.5	8.5
Dissolved Oxygen	mg/L	> 1.5	>8	7.2	7.2	7.2
pH	-	7.0 - 8.5	7.0 - 8.7	8.0	7.0 - 8.5	7.0 - 8.5
Temperature (summer)	°C	37	Narrative [3]	17.6 (Summer) 0 (Winter)	17.9 (Summer) 0.3 (Winter)	17.8 (Summer) 0.2 (Winter)

n/a – not available
[1] - CCME marine limit for NO_3^- as N
[2] - Maximum average increase of 5 mg/L from background levels for longer-term exposures (e.g., inputs lasting between 24 h and 30 d)
[3] - Human activities should not cause changes in ambient temperature of marine and estuarine water to exceed ±1°C at any time, location, or depth

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Conclusions for Alt-D Near-field Dilution

- Scenario with 6 ports discharge shows even better dilution around the diffuser at Alt-D than at Alt-C because of increased water depth and currents

- Dilution at Alt-D with effluent flow of 0.98 m^3/s is better than reduced effluent flow rate of 0.87 m^3/s for 6-port diffuser at Alt-C

- Both Alt-C or Alt-D locations are acceptable with respect to effluent discharge meeting receiving water quality objectives (either CCME or ambient conditions) at the edge of the 100-m mixing zone and based on CORMIX modelling (dilution) results

- Recall that conservative effluent quality and ambient conditions were used at Alt-D outfall location (and Alt-C)

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4 Engineering Considerations for Effluent Pipeline

a. Geotechnical Engineering

b. Marine Structural Engineering

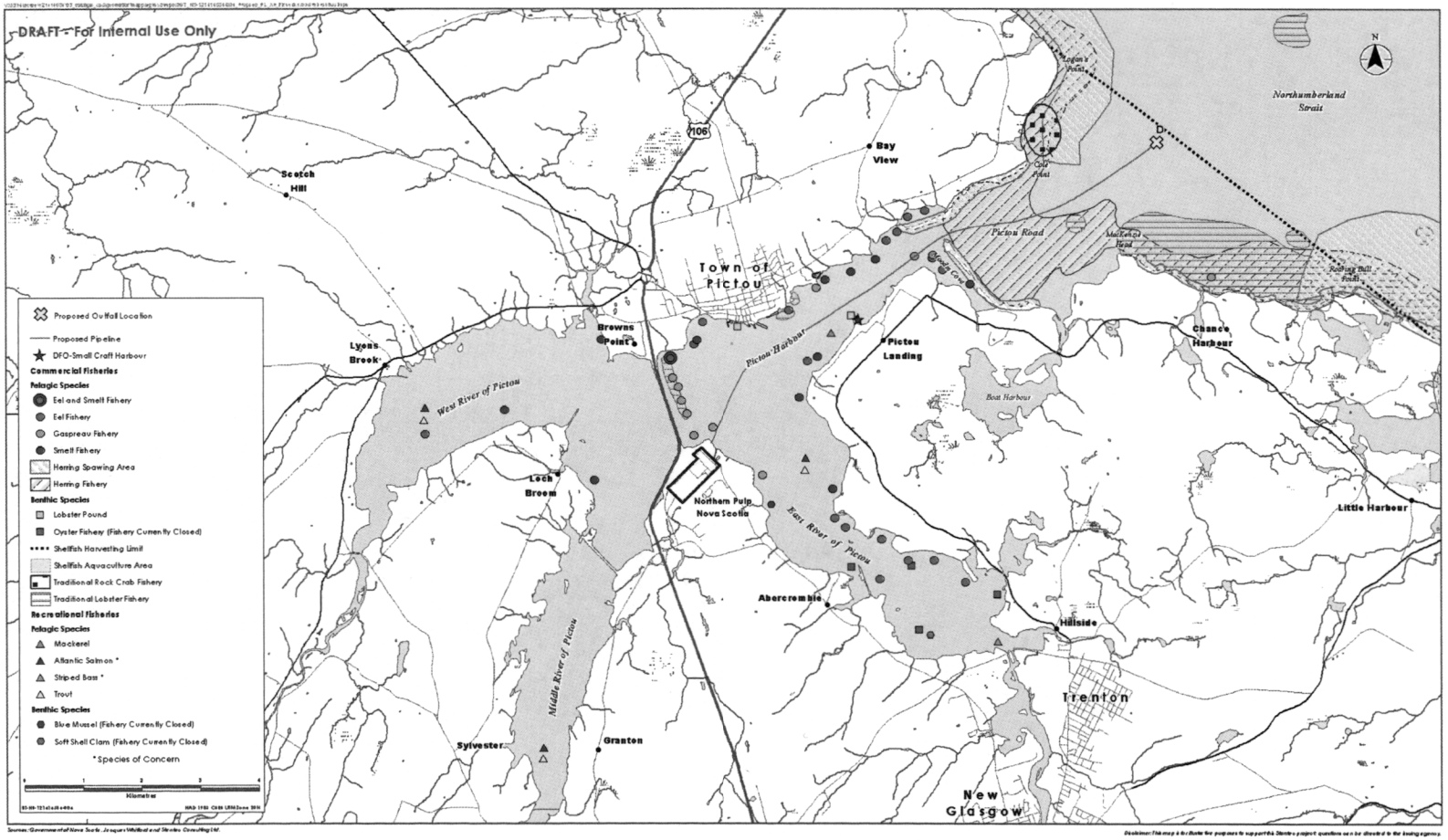
c. Civil Engineering

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4 Engineering Considerations

Pipeline Route to minimize interactions with sensitive environmental and socio-economic areas



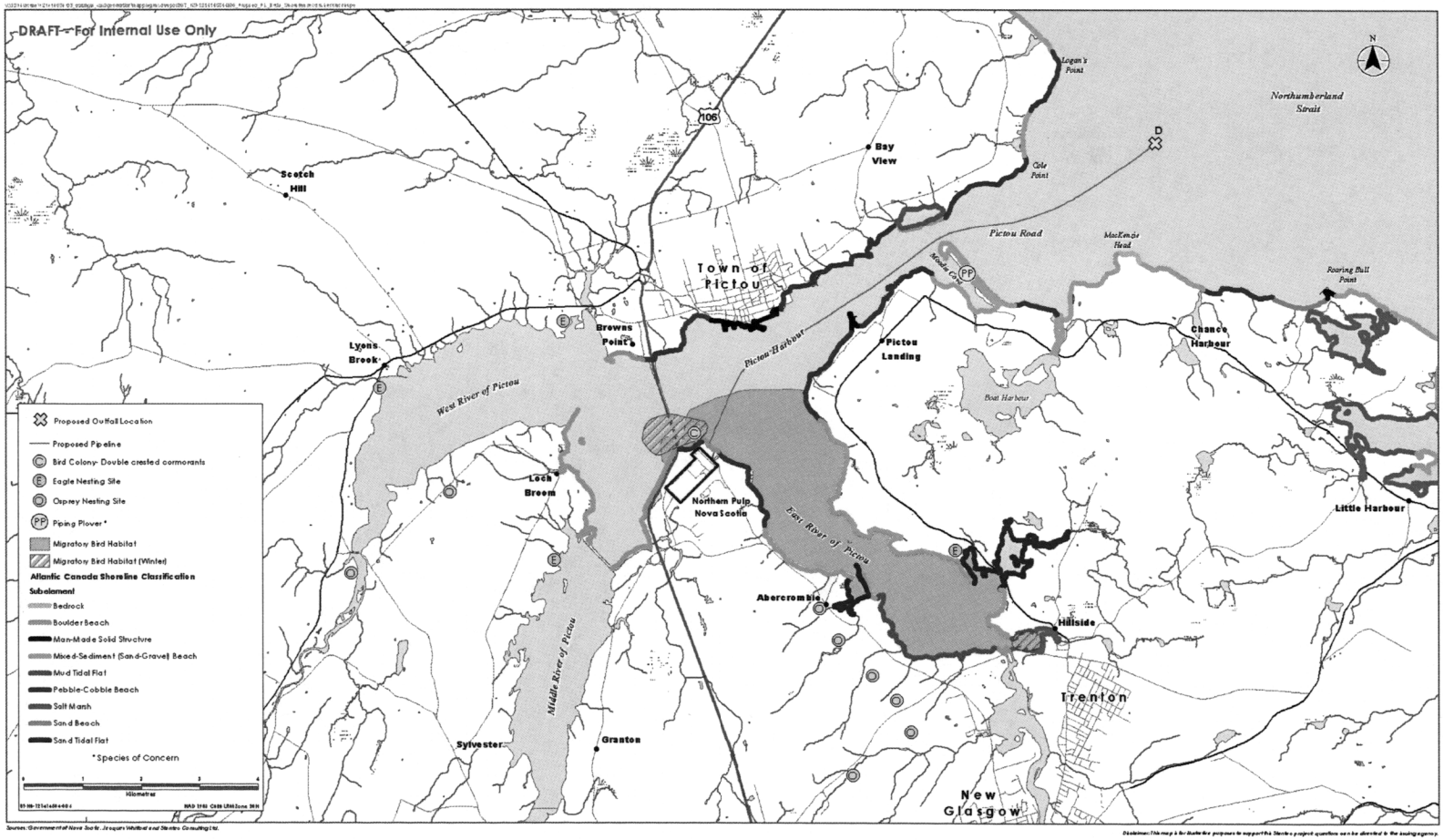
Proposed Pipeline Route and Commercial, Recreational, and Aboriginal Fishery Sensitivities in Pictou Harbour and Surrounding Areas

Figure 4-1

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4 Engineering Considerations

Pipeline Route to minimize interactions with sensitive environmental and socio-economic areas



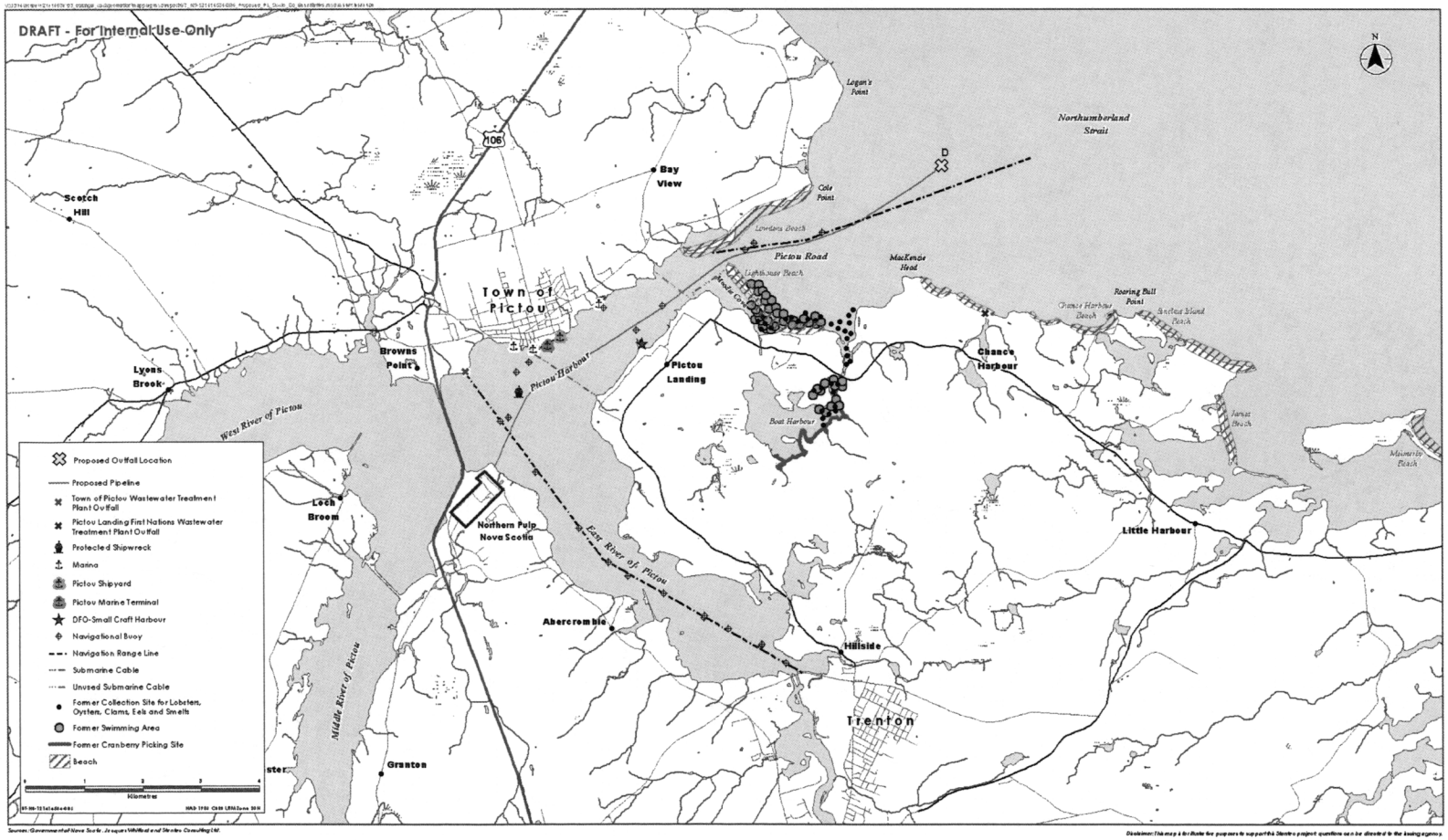
Proposed Pipeline Route and Bird and Shoreline Sensitivities in Pictou Harbour and Surrounding Areas

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4 Engineering Considerations

Pipeline Route to minimize interactions with sensitive environmental and socio-economic areas



Proposed Pipeline Route and Socio-economic Sensitivities in Pictou Harbour and Surrounding Areas

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4a. Geotechnical Engineering

Existing Information

- Stantec has completed several near-shore geotechnical investigations on either side of Pictou Harbour and had access to borehole data provided by KSH.

- The conditions encountered in the investigations indicate a soft compressible marine sediment layer that ranges from 7 to 15 m thick, overlying relatively thin layers of glacial till, followed by sandstone or mudstone bedrock.

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4a. Geotechnical Engineering

Geotechnical Constraints

- The presence of soft compressible silt in significant thicknesses is problematic for design and construction as it will result in significant amounts of total and differential settlements and pipe stresses on the outfall pipe.

- It is recommended that a geophysical and marine geotechnical investigation be completed to determine the soft silt thickness, to obtain strength parameters of the silt, and the time rates of consolidation for settlement estimates.

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4b. Marine Structural Engineering

Geotechnical Constraints

Soft Compressible Silt Layer Issues

- Extensive thickness of silt in Pictou Harbour (based on limited available info)
- Will result in extensive settlements of pipe
- Some harbour bottom sediment improvement desired but not entirely effective
- Expect differential settlements

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4b. Marine Structural Engineering

Ice Climate

Potential for Ice Scour



Ice on shore in front of mill (Feb. 9, 2017)

- Fast ice is expected in Pictou Harbour – Relatively stable
- Substantial ice pile-up expected near Northumberland Shore
- Ice scour is possible and should be anticipated in Northumberland Strait
- Potential damage to pipe, outfall and diffusers

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4b. Marine Structural Engineering

Outfall Pipe Fabrication

Outfall Pipe length = 9.5 km+/-

- Outfall pipe assembly required in segments (say up to 1000 m long)
- Fabricated segments joined at flanged connections by divers on the harbour bottom
- Expansion joints to accommodate change in length as pipe settles

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4b. Marine Structural Engineering

General installation



Near shore – Pictou Harbour

- Cut and cover with armour stone protection for approximately 0.5 km from shore (just beyond the navigable channel)

Bottom Lay – Pictou Harbour

- Thick blasted rock mattress and pipe cover

Pictou Road and Northumberland Strait

- Cut and cover with armour stone protection

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4c. Civil Engineering

Pipe Hydraulics

Calculations to determine the nominal diameter are based on:

- Outfall pipe expected to be approximately 9.5 km in length
- High density polyethylene pipe material
- Known depth indicates that the diffuser/discharge end of the pipe will be in approximately 12 m of water under normal conditions
- High tide and storm surge will add an additional 3.5 m of head on discharge end
- Maximum effluent daily flow is 0.984m^3/s
- Maintaining minimum cleansing velocity of 0.6 m/s

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4c. Civil Engineering

Pipe Hydraulics

Additional considerations for the design include:

- HDPE piping has flexibility over distance to bend, as such there will be no significant bends in pipe over the length
- Proposed diffusers will consider ports that are placed on the upper side of the pipe and extend beyond the rock cover depth
- Outfall pipe will sit on a rock mattress which follows the undulating ocean bottom profile
- Effluent from the new wastewater treatment facility will require pumping

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4c. Civil Engineering

Pipe Hydraulics

Preliminary estimates (to be confirmed):

- Outfall pipe could be between 36" to 42" in diameter (based on difference in elevation between land at 7.62 m and head at the discharge point at 9.5 km of minus (-)11.3 m; pipe diameter would decrease if this difference increases).
- Preliminary estimate of 20 m of head at pipe inlet could be adequate for the above pipe diameter and elevation difference indicated.
- If the mill's wastewater plant is situated at an elevation of approximately 7.6 m above sea level and it is to discharge under gravity conditions alone, a pipe diameter slightly larger than 48" would be required.

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Report can be found online:
https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/Appendix-A-D.pdf

Global Market Profiles

NBSK, UKP and BCTMP

Prepared for:

Northern Pulp Nova Scotia Corporation

By:

BRIAN MCCLAY & ASSOCIATES INC.

January 26, 2018

Brian McClay
& ASSOCIATES INC.

Pages 191 to / à 200

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Stantec Consulting Ltd.
102-40 Highfield Park Drive, Dartmouth NS B3A 0A3

January 5, 2018
File: 121415079

Attention: Terri Fraser, P.Eng.
Technical Manager
Northern Pulp Nova Scotia Corporation
PO Box 549, Station Main
New Glasgow, NS B2H 5E8

Dear Ms. Fraser,

Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

Stantec Consulting Ltd. (Stantec) is pleased to provide the following responses for external stakeholders with regards to the effluent discharge modelling for the proposed wastewater treatment plant replacement project.

Question 1: Why ice in the harbour won't affect the dispersion of effluent and the 100-m mixing zone as it was modelled?

Quick Answer:

Effluent dispersion in winter will not be restricted by ice because of temperature and density. The receiving water report delves into ice differential. Warmer months are most challenging for dispersion; in fact, in winter dispersion will be better and faster due to cold temperatures and buoyancy. This is a result of the larger temperature difference with the ambient marine water in Northumberland Strait, leading to a larger density difference between effluent and receiving water. Furthermore, the ice cover would increase turbulence. Modelling results indicate that the plume from a diffuser with six ports reaches the surface at about 90 m from the outfall. Therefore, the impact of ice in the Northumberland Strait on the shape of the plume will be very limited as subsurface mixing is already complete.

Additional technical supporting information:

When developing the mixing model for the Receiving Water Study (RWS), Stantec recommended using a more conservative case scenario when evaluating the mixing zone in the receiving environment. As detailed below, the conditions for the more conservative case are found to occur during the summer months when the temperature and density play a lessor role in effluent mixing. In winter, mixing is effectively enhanced due to the larger difference in temperature and salinity (density) conditions. The technical discussion of this aspect is described below.

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Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

Effluent plume dispersion involves a two-stage physical mixing process.

- The first stage is the initial mixing, which is dominated by the effluent jet discharge velocity and the differences in density between the effluent and the receiving water. The higher jet velocities exiting the diffuser creates turbulent mixing in the receiving water that persists until the turbulent momentum dissipates. Concurrently, the less dense effluent (compared to the receiving water in Northumberland Strait) is more buoyant, causing the effluent plume to rise upwards to the surface, further facilitating effluent mixing. It should be noted that as the difference in temperature increases between the effluent and the saline receiving environment, the mixing effectiveness increases as the plume is more buoyant (less dense). Warmer months therefore exhibit poorer initial mixing zone conditions.

- In the second stage of the physical mixing process, additional mixing is then facilitated by other factors in the receiving environment such as tidal currents, water levels, water quality, and freshwater inflows, as well as climactic conditions such as wind, waves and ice. The receiving water currents predominantly drive this latter stage of dispersion, causing the effluent plume to move horizontally.

Stantec applied a summertime scenario to the model as there would be poorer effluent plume mixing due to the smaller temperature differences (and thus buoyant mixing). Further, we minimized the potential effects of surface mixing by modelling and using smaller tidal ranges, warmer ambient waters, less wind-driven surface currents, and low freshwater inflows from rivers.

The receiving water conditions and the presence of ice during the winter season in Northumberland Strait are expected to be more favourable for effluent mixing and dispersion, compared to summer discharge conditions. This is a result of the larger temperature difference with the ambient marine water in Northumberland Strait, leading to a larger density difference between the effluent and receiving water and an increased effect of plume buoyancy on the mixing process. Therefore, it is expected a higher dilution will be achieved during the winter season compared to the summer season. Furthermore, the presence of ice cover would increase turbulence at the ice/water interface by providing resistance to the ambient water currents, resulting in a higher mixing and dilution.

In addition, results of the three-dimensional (3D) CORMIX modelling investigation (Stantec 2017) indicated that the plume from six ports at the Alt-D location reaches the surface at about 90 m from the diffuser where the effluent is fully mixed with ambient water (dilution ratio is 102 times) and vertical and horizontal velocities of the effluent are very small. Therefore, the impact of ice in Northumberland Strait on the shape of the plume will be very limited as subsurface mixing is already complete.

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Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

Question 2: What happens to effluent in a "freak storm" with surge tides?

Quick Answer:

Surge tides generate turbulence and ultimately provide better and faster mixing conditions.

Additional technical supporting information:

Storm surges will beneficially increase the circulation currents (including tidal currents and surface currents) and turbulence in the receiving waters, enhancing effluent mixing within the receiving environment. With storm events, a higher dilution ratio of the effluent plume in the receiving environment is expected.

Question 3: How salinity was indirectly modelled (through density) in the report and when it will meet background salinity in the Strait?

Quick Answer:

Density is the major factor governing the vertical movements of ocean waters. The density distribution is based on temperature and salinity data. Salinity will be within 2% of background five metres away from the outfall.

Additional technical supporting information:

Density is the major factor governing the vertical movements of ocean waters. When density is not measured directly (as for this site), standard industry practice allows it to be calculated based on salinity and temperature; these two parameters were obtained from previous studies (ENSR 1999, JWEL 1996) and were inputs to the model. The density distribution in the 3D CORMIX numerical model is calculated using the full United Nations Educational, Scientific and Cultural Organization (UNESCO) equation of state, which is based on user-provided temperature and salinity data.

As discussed below, salinity will be within 2% of background five metres away from the outfall. The salinity used for the effluent (expressed as Total Dissolved Solids (TDS)) was 4 g/L. Ambient salinity for the study area is approximately 27.5 g/L. Results for the effluent dilution ratios for various scenarios are presented in Table 3-4 of the RWS report (Stantec 2017). The CORMIX modelling results indicate that for the marine outfall at the Alt-D location with a six-port diffuser, the dilution ratio is 36.3 times within 5 m of the diffuser. The resulting effluent salinity in the plume 5 m from the outfall is calculated to be 26.9 g/L (i.e., ((36.3 L x 27.5 g/L) + 4 g)/ (36.3 L + 1 L)) which is 2 % less than background. This low difference in salinity will quickly reduce with increasing distance from the outfall.

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Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

Question 4: A brief discussion regarding the data for the fisheries map [used in the RWS report].

The data used to investigate the environmental sensitivities in the study area with respect to the type of fishery species that could be present and their mapping were based on commercial, recreational, and/or Aboriginal fisheries identified in existing reports. The fisheries information in Figure 2-10 of the RWS report is based on previous environmental impact assessments conducted for Boat Harbour (JWEL 1994, 2005) and environmental effects monitoring investigations that describe resources for the area (Stantec, 2004; Ecometrix 2007, 2016). The information in these reports also relied on communications with commercial fishers, First Nations, and/or the Department of Fisheries and Oceans Canada (DFO) at that time to identify the fishery species and location of fishing grounds, which was adequate for the purposes of the RWS. More recent commercial fisheries catch data that DFO can provide are fisheries landings data in grid areas 7 km by 11 km (see attached Figure 1 further below). Fisheries data at this course scale would not be practical or useful for the purposes of the RWS. Furthermore, to comply with the relatively recent Government of Canada's privacy policy, any grid cell area containing data from less than five identified vessels, licences, or fishers are labelled as privacy-screened areas where no data can be provided. To obtain more recent fisheries information and fisheries catch effort data at an appropriate spatial scale for the relatively small dimensions of the effluent plume would require consultations with commercial fishers and the engagement of Indigenous communities. These activities were beyond the scope of the RWS investigation and likely could be a component of the environmental assessment process for the project.

CLOSING

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Any use that a third party makes of this letter, or any reliance on decisions made based on it, are the responsibility of such third parties. Stantec Consulting Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken, based on this letter.

The information and conclusions contained in this letter are based upon work undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Conclusions and recommendations presented in this letter should not be construed as legal advice.

The conclusions presented in this letter represent the best technical judgment of Stantec Consulting Ltd. based on the data obtained from the work. If any conditions become apparent that differ from our understanding of conditions as presented in this letter, we request that we be notified immediately to reassess the conclusions provided herein.

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Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

This letter was prepared by Shelton Liu (Ph.D., P.Eng.), Igor Iskra (Ph.D., P.Eng.), reviewed by Sam Salley (M.Sc.) and independently reviewed by Michael Charles (P.Eng.).

Regards,

STANTEC CONSULTING LTD.

Sam Salley, M.Sc.
Project Manager, Senior Marine Scientist
Phone: (902) 468-7777
Fax: (902) 468-9009
Sam.salley@stantec.com

Attachment: Figure 1 – 7 km by 11 km Grid Size of DFO Commercial Fisheries Landings Data for Northumberland Strait

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Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

REFERENCES

Ecomtrix. 2007. EEM Cycle 4 Interpretive Report for the Neenah Paper (Pictou Mill) Facility at New Glasgow, Nova Scotia. Report prepared for Neenah Paper Inc. (Pictou Mill).

Ecomtrix. 2016. EEM Cycle 7 Interpretive Report for the Northern Pulp Nova Scotia Corp. Facility near Pictou, Nova Scotia. Report prepared for Northern Pulp Nova Scotia Corp.

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Jacques Whitford Environment Limited (JWEL), 1996. First cycle EEM aquatic environmental effects monitoring program Boat Harbour waste water treatment facility. Report to Environment Canada on behalf of the Nova Scotia Department of Supply and Services, 65 p. appendices A - I.

Jacques Whitford Environment Limited (JWEL). 2005. Re-introduction of Tidal Influence to Boat Harbour, Pictou County, Nova Scotia.

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V:\1214\active\121415079\05_report_deliv\deliverable\121415079_RWS_response_20180105.docx

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

Reference: Information Request Responses, Receiving Water Study for the Northern Pulp Effluent Treatment Plant Replacement Project, Pictou Harbour, Nova Scotia

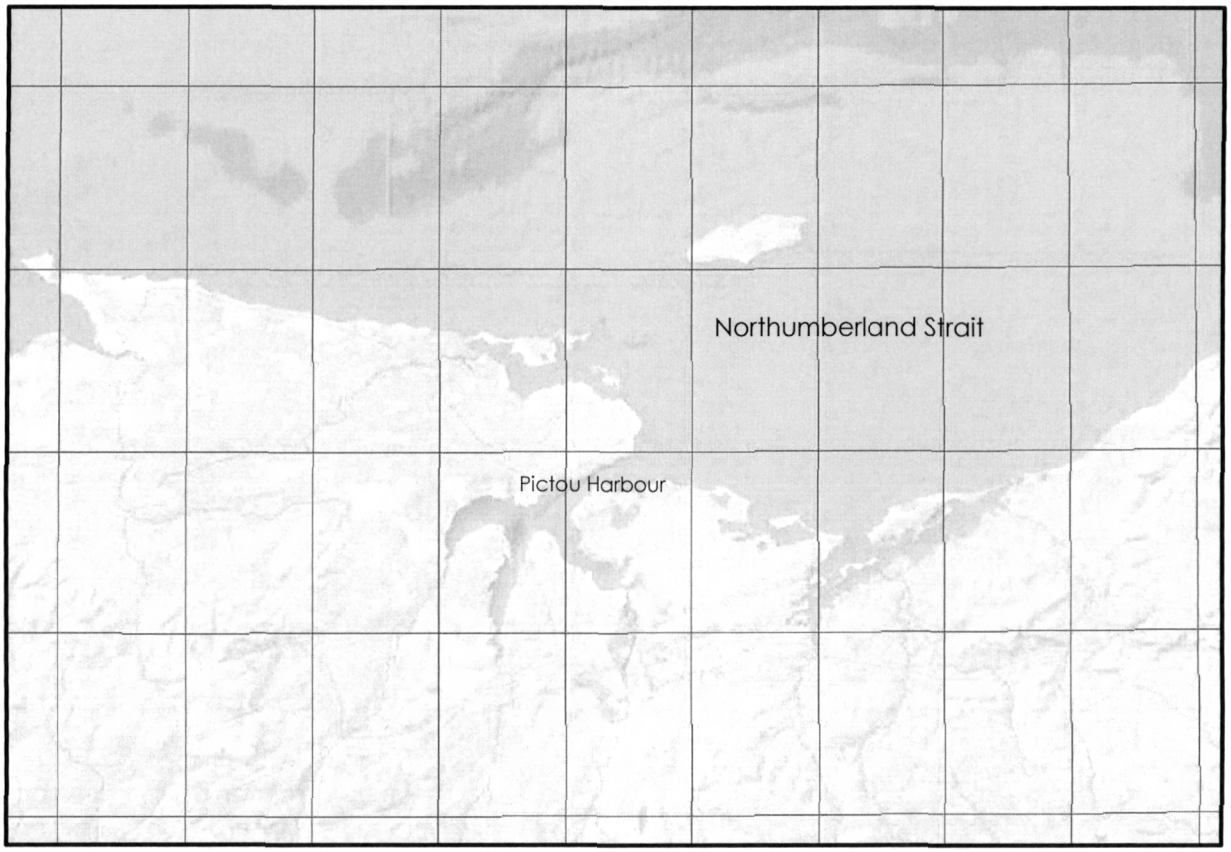


Figure 1 - 7 km by 11 km Grid Size of DFO Commercial Fisheries Landings Data for Northumberland Strait

Report can be found online:
https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/Appendix-J1-1.pdf

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Context for 2016 EEM Report

DILLON CONSULTING

What is an EEM

In May 1992, Environment Canada (now referred to as Environment and Climate Change Canada - ECCC) and the federal Department of Fisheries and Oceans (DFO) amended the Pulp and Paper Effluent Regulations (PPER) under the *Fisheries Act*. These amendments prescribed that all mills were required to conduct an Environmental Effects Monitoring (EEM) program. EEM programs are designed to detect and measure changes in aquatic ecosystems, including assessment of long-term effects. ECCC provides review of study design and monitoring results.

The Current EEM Study Framework is for the Boat Harbour Facility not the Replacement Effluent Treatment Facility

The EEM study results have been requested by the public during 2017 Community Open Houses on the proposed replacement effluent treatment facility. **This EEM study is not directly applicable to the proposed replacement effluent treatment facility and associated treated effluent.** The EEM study evaluates the existing effluent being discharged into the Northumberland Strait from the Boat Harbour Effluent Treatment Facility. Samples for Cycle 7 were collected from the downstream end of the Boat Harbour Estuary and from three reference areas (i.e., Merigomish Harbour, Logan's Point and Little Harbour).

EEM is an on-going monitoring program as required by ECCC. The monitoring will continue for the new discharge location, if approved, subsequent to the Environmental Assessment process; however new EEM methodology would likely be required to address the new area and effluent. A new discharge location would require a new plume delineation study to be conducted to determine the extent of the 1% effluent envelope for the purpose of identifying exposure and reference sampling locations for EEM. The implication of the proposed replacement offshore discharge location is that new benthic and fish survey programs would likely have to be designed and implemented – essentially the EEM field survey program would have to be revamped. The exposure areas that have previously been sampled presumably won't be relevant anymore, and new reference locations may also need to be established to match the new exposure area habitat(s). Also, the overall quality of treated effluent that would be discharged from the replacement effluent treatment system is expected to be better than that of today, thus reaffirming that **this EEM study is not directly applicable to the proposed replacement effluent treatment facility and associated treated effluent.**

Pages 209 to / à 356

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est public-refusé en vertu de l'article

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Report can be found online:
https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/Appendix-J1-2.pdf

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Appendix A NOTES ON QUALITY ASSURANCE/ QUALITY CONTROL

Pages 358 to / à 557

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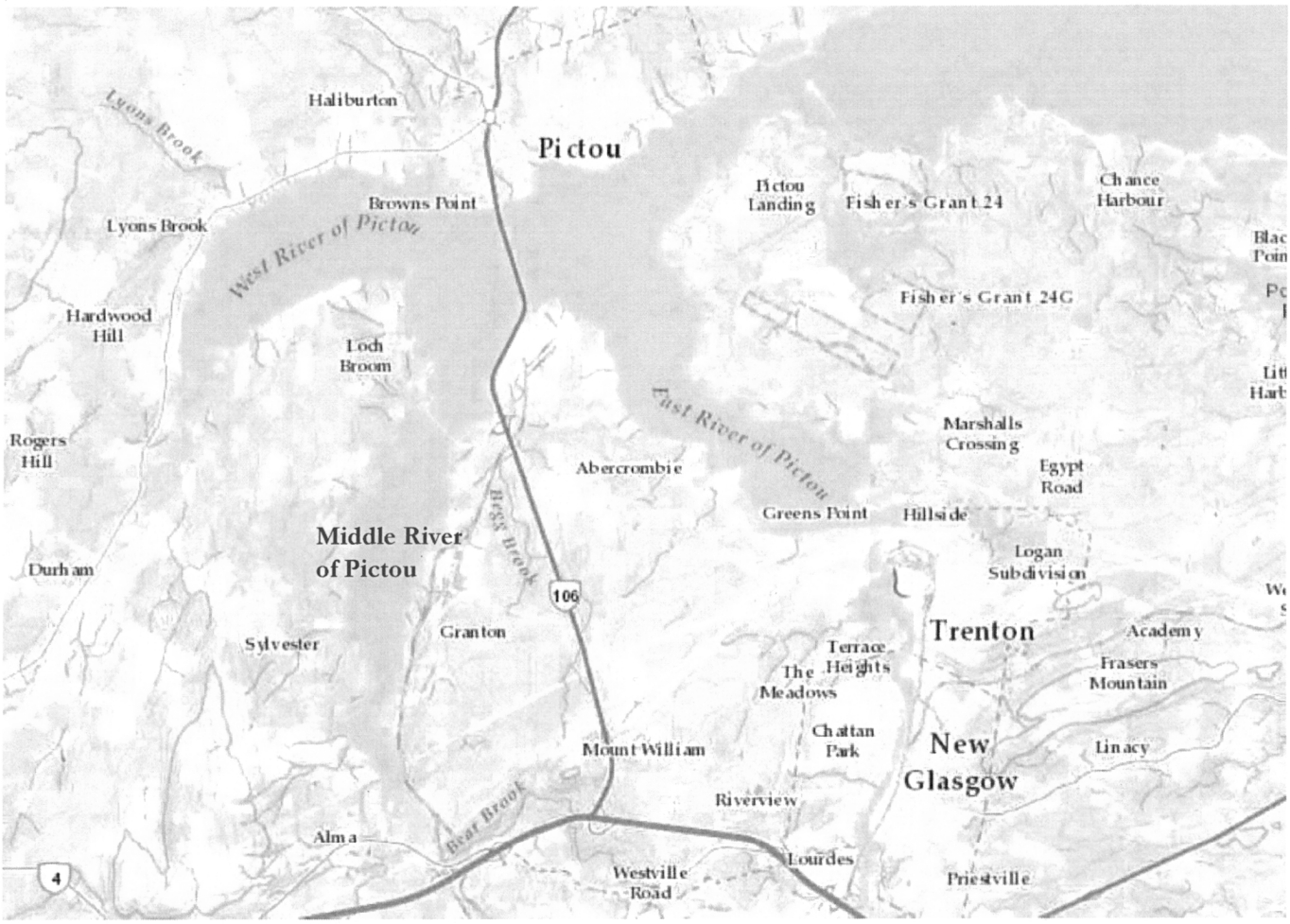
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Report can be found online:
https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/Appendix-M-N.pdf
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Middle River of Pictou Water Availability

Final Report

December 17, 2015

Prepared for:

NOVA SCOTIA
CANADA

R.V. Anderson Associates Limited
engineering · environment · infrastructure

CANADA'S BEST MANAGED COMPANIES
Platinum member

Pages 559 to / à 581

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Report can be found online:
https://novascotia.ca/nse/ea/Replacement_Effluent_Treatment_Facility_Project/Appendix-I1-I2.pdf

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DILLON
CONSULTING

NORTHERN PULP NOVA SCOTIA CORPORATION
REPLACEMENT EFFLUENT TREATMENT FACILITY
ENVIRONMENTAL ASSESSMENT

Project Launch: Summary of Engagement

What We Heard

March 2018

Pages 583 to / à 624

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s.16(2)
s.19(1)

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Jalloh, Rugi

From: Guy R. Martin [redacted]
Sent: October-02-17 8:41 AM
To: Wong, Brian
Cc: Jalloh, Rugi; Terri Fraser
Subject: Re: 250742 - FTP access

Hi Brian,

The FTP site may have been deactivated. I'll check on it's status (and whether the file is still there) first thing Monday morning

Guy

[redacted]

On Sep 29, 2017, at 6:45 PM, Wong, Brian <Brian.Wong@dfo-mpo.gc.ca> wrote:

> Hello Rugi,
>
> I am unable to access the ftp with the provided information.
> Is there a different network port that we should be using instead of the default port 21 ?
>
> I need to get info via FTP site but need to download using google chrome. Not able to do it and need assistance. See info below:
>
> From: Guy R. Martin [redacted]
> Sent: September-13-17 12:46 PM
> To: Jalloh, Rugi
> Subject: RE: Northern Pulp Nova Scotia Effluent Replacement Project (17-HMAR-00193)
>
> Hi Rugi,
>
> Here are the instructions to access the file. Let me know if you have any issues with the file transfer.
>
> Regards,
>
> Guy
>
> FTP INSTRUCTIONS
>
> *** A few points to note when accessing an FTP:
> - If you choose to use Internet Explorer to access the FTP, please clear out your internet cookies, temp files and history (close and restart your web browser to be sure the changes take effect – This link shows you how to clear your cache: http://www.wikihow.com/Clear-Your-Browser%27s-Cache)
> - When you copy and paste the FTP Link in the address bar, make sure you did not copy and paste an extra space or character(s) at the beginning or end of the ftp address
> - Verify with your IT team that the FTP is not being blocked either from a server filter or via the computer (proxy settings)
>
> KSH FTP Instructions:
> Open My Computer icon or Windows Explorer (not Internet Explorer)
> Copy and Paste the following link in the Address Bar
> [redacted]
> Press Enter
>
> If there is a prompt for username and/or password:
>
> Username: [redacted]
> Password:

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.....
Guy R. Martin, ing
Conseiller Principal, Procédés et Environnement /
Principal Consultant, Process and Environment
KSH Consulting
1 Place Alexis Nihon
3400 de Maisonneuve O., bureau 1500
Montréal (Québec) Canada H3Z 3B8
T [redacted] M [redacted] F 514.939.5266

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Wambolt, Michael

From: Jalloh, Rugi
Sent: November-28-17 11:50 AM
To: Wambolt, Michael
Cc: Smith, Colleen A
Subject: Northern Pulp Nova Scotia Effluent Replacement Project - Telephone Conversation

Hello Mike:
I had a telephone conversation with Karen March, Senior Biologist Associate and Annamarie Burgess, Planner/Engineer at Dillon Consulting. They were both in the last EA meeting organized by NSE and Colleen and were in attendance. I was informed that they will be responsible for proving the biological information i.e. (re: additional info required by DFO-FPP) in order to complete the review. I was told that the plan is to undertake the underwater habitat benthic study in the Spring (April-May). I was initially dealing with Guy Martin from RSH Consulting located in Quebec who completed the design of the pipe and the associated outfall.

I was informed that they (Dillon Reps) have engaged Fishing organizations and the Pictou Landing First Nations group. A meeting has been arranged for next week to meet with fishing organizations to get their input . They have already met with the Pictou Landing First Nations group who have environmental concerns especially impacts of the project on the fisheries. Nova Scotia Aboriginal Affairs participated in this meeting. I reiterated what I have initially requested in the last EA meeting that DFO-FPP should be involved in the Indigenous engagement and/or consultation process until we are certain that our involvement is not required. I reminded them to send us the list of fishing organizations/groups that are being engaged.

Dillon will get back to us after their meeting next week and we will determine a meeting date where Reps from Dillon, Northern Pulp NS Corp and FPP will discuss FPP's requirements and process; clarify roles and responsibilities, timelines, answer any questions that may arise.

Thanks,

Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
Fax/ téléc: 902-426-1489
1 Challenger Dr./1 promenade Challenger
P.O. Box/C.P. 1006, Station P410
Dartmouth, NS/NE B2Y 4A2

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Smith, Colleen A

From: Smith, Colleen A
Sent: January-05-18 12:13 PM
To: McLean, Mark G; Wambolt, Michael
Cc: MacEachern, Leroy
Subject: RE: INFORMAL: Northern Pulp
Attachments: Fisheries landings data.pdf

Hi Mark,

I requested more specific fisheries landings data from the Commercial Data Division in the Gulf Region in anticipation of these types of requests. Please find attached Landings and Values of various species, 2014-2016. Note that some fishing areas such as snow crab include a very large geographic area in the Northumberland Straight. This information has been vetted for privacy concerns so that it can be released publically. Also, please find link to DFO's fishing areas.
http://www.glf.dfo-mpo.gc.ca/Gulf/Fishing-Area-Maps/Lobster

You can search for other species i.e. snow crab, rock crab, herring, etc. from this link.

The challenge is that this information is not geographic, we cannot determine where the fish are being caught from this data. I am not certain if an analysis such as that would be possible (not sure of the integrity of the data). If so, a request would need to be made to CDD in the Gulf Region, FPP does not have that data.

Hope this helps,
Colleen

From: McLean, Mark G
Sent: January-04-18 9:55 AM
To: Smith, Colleen A; Wambolt, Michael
Cc: MacEachern, Leroy
Subject: FW: INFORMAL: Northern Pulp

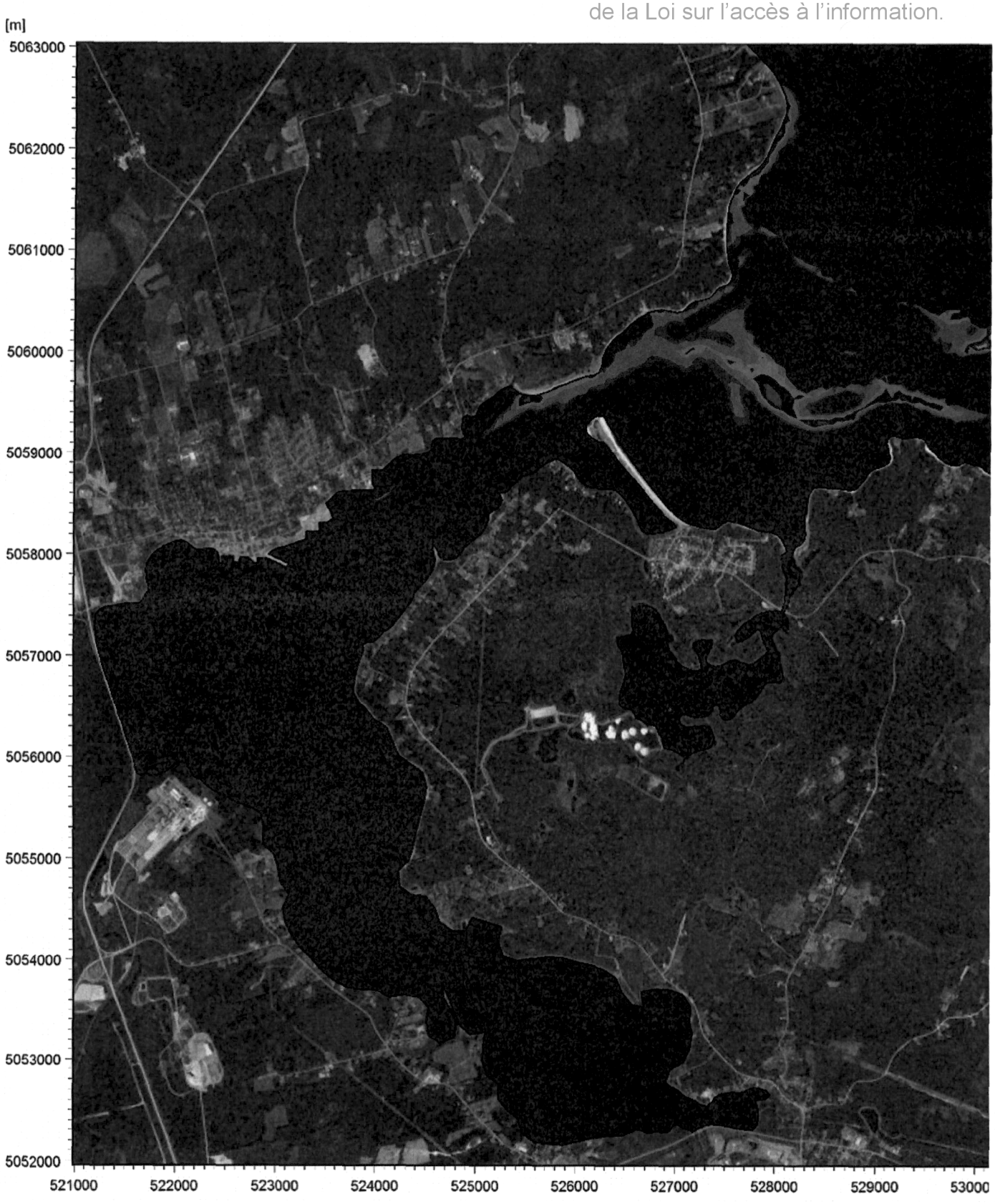
Mike and Colleen:

As noted below the MINO wants to better understand the events happening in NS as it relates to Northern Pulp. They are wondering if DFO has any data or information over the past 5-7 years or more, as to where the lobsters are as it relates to the intended pumping of waters from the plant.

I noticed that we have the receiving waters study which is helpful to focusing on the potential area of impacts. I've pull the figure showing the dilution modelling below (this is just one of four possible outfall locations but this option has the outfall furthest into the Northumberland Strait) and copied this to Leroy who may be able to add information on lobster in the area just outside of Pictou Harbour. We will also need to highlight the fact that concerns include not just adult lobsters but also concerns from potential impacts to larvae stages from freshwater at the outfall. Thanks.

Mark

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Alt-D Discharge: Spatial Distribution of Simulated Effluent Dilution Factor at the End of a One-Month Simulation Period (assuming no particle degradation over the simulation period)

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From: Rossignol, Pauline
Sent: January-04-18 9:16 AM
To: Williams, Wendy
Cc: McLean, Mark G
Subject: INFORMAL: Northern Pulp

Hi Wendy, this Informal seems to relate to FPP however input may be required from FM and/or Gulf. Can you take the lead? Please confirm if a response can be prepared by COB January 8th. Tks

Pauline

From: Trudeau, Miriam
Sent: January-03-18 4:42 PM
To: Rossignol, Pauline
Cc: Hopkins, Lillian; Butcher, Ashley; Malko, Carol; Jarjour, Jasmine; Marroquin, René
Subject: INFORMAL: Northern Pulp

Allo Pauline,

MINO wants to better understand the events happening in NS as it relates to Northern Pulp. They are wondering if DFO has any data or information over the past 5-7 years or more, as to where the lobsters are as it relates to the intended pumping of waters from the plant.

Miriam ☺

Miriam Trudeau
Director, Departmental Liaison
Directrice, Liaison ministériel

Fisheries and Oceans Canada | Pêches et Océans Canada
200 Kent Street | 200, rue Kent | 15N114
Ottawa, Canada K1A 0E6
(613) 947-4557| miriam.trudeau@dfo-mpo.gc.ca

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It's important to note:

- 2016 data is preliminary and subject to change without notice.
- There were no recorded landing of oysters in Pictou Harbour. The numbers included below reflect landings in the Statistical District 11 which includes Pictou Harbour.
- Data specific motes are included at the bottom of the table. Please see those for more information.

Landings and Values, various species, 2014-2016p

Source: Gulf Region Statistics Database, Strategic Services, Gulf Region

Report created on December 20, 2017

Year	Species	Fishing Area / Landing Port	Round Weight (KG)	Value ($)
2014	COD	4T8	458	752
2014	HALIBUT	4T8	2,838	35,730
2014	OTHER GF*	4T8	2,438	3,319
2014	CRAB, ROCK	26A	1,605,089	1,908,445
2014	CRAB, SNOW	12	14,164,508	92,447,339
2014	HERRING**	16F	5,191,280	1,922,400
2014	LOBSTER	26A	6,444,206	56,060,819
2014	OYSTERS, AMERICAN***	CARIBOU/FERRY WHARF	9,362	43,879
2014	OYSTERS, AMERICAN***	PICTOU/CARIBOU ISLAND/SAND POINT/CAPE JOHN	269	1,109
2014	SCALLOP, SEA	24	154,203	388,818
2015	COD	4T8	261	381
2015	HALIBUT	4T8	5,755	78,858
2015	OTHER GF*	4T8	11,072	23,527
2015	CRAB, ROCK	26A	1,171,801	1,375,748
2015	CRAB, SNOW	12	17,191,507	103,931,574
2015	HERRING**	16F	5,845,121	2,167,462
2015	LOBSTER	26A	5,753,343	61,486,486
2015	OYSTERS, AMERICAN***	CARIBOU/FERRY WHARF	14,919	82,202
2015	OYSTERS, AMERICAN***	PICTOU/CARIBOU ISLAND/SAND POINT/CAPE JOHN	2,072	11,644
2015	SCALLOP, SEA	24	140,558	459,961
2016	COD	4T8	622	726

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2016	HALIBUT	4T8	6,692	93,638
2016	OTHER GF*	4T8	9,665	15,378
2016	CRAB, ROCK	26A	1,414,681	1,380,996
2016	CRAB, SNOW	12	14,289,462	117,964,212
2016	HERRING**	16F	4,507,038	3,154,927
2016	LOBSTER	26A	5,070,938	71,143,806
2016	OYSTERS, AMERICAN***	CARIBOU/FERRY WHARF	2,905	13,676
2016	SCALLOP, SEA	24	196,002	676,796

* Other GF species were pooled to preserve participant confidentiality. This grouping includes Rock Cod, American Plaice, Winter Flounder, White Hake, Sculpin and Dogfish.

** Herring numbers do not include bait landings or herring landed as by-catch in the mackerel fishery as these fisheries use different fishing areas

*** Some data by port was combined to preserver participant confidentiality.

s.19(1)

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Jalloh, Rugi

From: March, Karen [redacted]
Sent: January-08-18 4:06 PM
To: Jalloh, Rugi; Annamarie Burgess
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Thanks Rugi
I will confirm timing later this week.
Karen

On Mon, Jan 8, 2018 at 4:04 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hello Karen,

Thanks for the phone call this afternoon. In terms of the meeting at Pictou Landing this evening, would you please send us the minutes of the meeting and/or any other follow up correspondence? Are any other government departments attending this meeting?

Let us know when you will be available to meet. I can book a meeting room here at BIO.

Thanks,

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

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--

Karen March, M.Sc.
Project Manager, Senior Biologist
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
[redacted]
www.dillon.ca

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Jalloh, Rugi

From: March, Karen [redacted]
Sent: January-19-18 3:49 PM
To: Jalloh, Rugi
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Thanks

On Fri, Jan 19, 2018 at 3:35 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hi Karen,

I will set up a conference phone and will provide you with details next week.

Thanks

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen [redacted]
Sent: January-19-18 3:04 PM
To: Jalloh, Rugi
Cc: Annamarie Burgess; Joseph de Laronde
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi

Would you have a phone available for a Dillon person from another office to call in? - Joe de Laronde.

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If not we can connect him in by cell phone.

Thanks

Karen

On Fri, Jan 19, 2018 at 11:00 AM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Thanks Karen.

We will put our thoughts together on Monday afternoon, so If you any agenda item, please let me know.

Have a great weekend and looking forward to seeing you next. Will send the meeting request shortly.

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen [redacted]
Sent: January-19-18 10:39 AM
To: Jalloh, Rugi
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi - Gary Porter indicated he intended to come - his contact was included. Thanks

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On Fri, Jan 19, 2018 at 10:36 AM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Thanks Karen. Is the gentleman I believe Potter from TIR, still coming to the meeting?

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen [redacted]
Sent: January-19-18 9:39 AM
To: Jalloh, Rugi
Cc: Annamarie Burgess
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi - emails below - thanks

[redacted]

sdevereaux@dillon.ca

terri.fraser@northernpulp.com

aburgess@dillon.ca

[redacted]

gary.s.porter@novascotia.ca

michael.wilson@northernpulp.com

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On Fri, Jan 19, 2018 at 9:14 AM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hi Karen,

I need to send an outlook invite for the meeting at BIO from 10-12, who do I send it to?

Thanks

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen
Sent: January-17-18 3:07 PM
To: Jalloh, Rugi
Cc: Annamarie Burgess; Smith, Colleen A
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi - it sounds like it will be 6-7 people from Dillon/NPNS. Thanks

On Wed, Jan 17, 2018 at 2:50 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hello Karen,

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We are meeting in order to discuss DFO's information requirements, Fisheries Act authorization process, timelines, etc. I am not sure if this meeting would of value to others.

I need to book a room, how people should we expect to attend this meeting?

Thanks,

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

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Dartmouth, NS/NE B2Y 4A2

From: March, Karen
Sent: January-17-18 12:30 PM
To: Jalloh, Rugi
Cc: Annamarie Burgess
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi, I believe Gary Porter from TIR also wanted to be involved and we will let the EA Branch know that we intend to meet.

Thanks

On Wed, Jan 17, 2018 at 12:05 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hi Karen,

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Would the Proponent's Rep (Terri Fraser) be available to attend?

Thanks,

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen [redacted]
Sent: January-17-18 11:35 AM
To: Jalloh, Rugi
Cc: Annamarie Burgess
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi

Northern Pulp's option for next week is Wednesday the 24th at 10 am. If that doesn't work we will have to look at the following week.

Thanks

Karen

On Mon, Jan 15, 2018 at 3:21 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Thanks Karen!

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Rugi Jalloh, Fisheries Protection Biologist

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Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: March, Karen [redacted]
Sent: January-15-18 3:02 PM
To: Jalloh, Rugi
Cc: Annamarie Burgess
Subject: Re: Northern Pulp Nova Scotia Effluent Replacement Project

Hi Rugi

The Jan 8th session with Pictou Landing First Nation was a community open house format and as such there are no minutes.

In Summary: Attendees were invited to review information panels and project team members (including staff from Northern Pulp, KSH, and Dillon) were available to discuss the project and answer questions. We had nearly 70 attendees that night. Conversations focused on environmental concerns for marine life and risk to community livelihood and well being.

We are confirming with Northern Pulp potential dates to meet with DFO to review DFO requirements, and provide an update on open houses and other public information sessions. As suggested we will provide a couple of options for the meeting date scheduling.

Thanks

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Karen

On Mon, Jan 8, 2018 at 4:04 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hello Karen,

Thanks for the phone call this afternoon. In terms of the meeting at Pictou Landing this evening, would you please send us the minutes of the meeting and/or any other follow up correspondence? Are any other government departments attending this meeting?

Let us know when you will be available to meet. I can book a meeting room here at BIO.

Thanks,

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

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Karen March, M.Sc.
Project Manager, Senior Biologist
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137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T -
F - 902.450.2008
M -
www.dillon.ca
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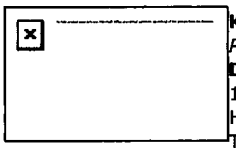
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Jalloh, Rugi

From: March, Karen [redacted]
Sent: January-24-18 3:02 PM
To: Jalloh, Rugi
Subject: Re: Today's meeting

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Rugi
Thank you for the meeting, it was definitely helpful for our and Northern Pulps understanding.

Cloutier, Kathy" <Kathy.Cloutier@northernpulp.com is Director of Communications for Paper Excellence
Gary.S.Porter@novascotia.ca" <Gary.S.Porter@novascotia.ca Executive Director, Corporate Initiatives - is Nova Scotia Department of Transportation and Infrastructure Renewals representative
de Laronde, Joe [redacted] is Dillon's Indigenous Specialist but also is a ecologist with Fisheries Act experience

Karen

On Wed, Jan 24, 2018 at 2:18 PM, Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca> wrote:

Hello Karen,

Thanks again for your help in coordinating the meeting. I hope the information obtained would be helpful in moving forward with the work.

Would you please help clarify the following:

Cathy, is her last name Courtier? She is with NPNS or Dillon?

What is Joe's last name? I believe he helps the fisheries biology aspect with Dillon (on the phone)

Gary Porter with TIR. What is his or TIR's role in this project?

Again, thank you for your assistance.

Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

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Fisheries and Oceans Canada/Pêches et Océons Canada

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--

DILLON CONSULTING

Karen March, M.Sc.
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NORTHERN PULP NOVA SCOTIA EFFLUENT REPLACEMENT PROJECT MEETING

January 25, 2018 at 10 am- 12:00 pm at BIO

ATTENDEES

1. Cathy Courtier – Northern Pulp
2. Gary Porter – NSTIR
3. Karen March – Dillon Consulting
4. Terri Fraser – Dillon Consulting
5. Annamarie Burgess - Dillon Consulting
6. Joe Doulerant (via teleconference) - Dillon Consulting
7. Colleen Smith – DFO-FPP
8. Mike Wambolt – DFO-FPP
9. Rugi Jalloh – DFO-FPP

Annamarie provided an update of consultations in December 2017 and January 2018 that Northern Pulp and Paper held including:

- Pictou Landing First Nation (60 participants including other fishing industry reps)
- Fishing industry specific meetings
- Two general open houses to the general public

Annamarie stated that in general, there has been a lot of opposition to the project and concerns about impacts to the environment from all groups mentioned above.

Crown – Duty to Consult with Aboriginal Groups

NSTIR have started an Indigenous Consultation process following the Terms of Reference. Gary mentioned that the KMKNO have indicated that they wish to consult and that Pictou Landing First Nation will lead the consultation process. He asked about a coordinated whole of government approach to consultation and when and if DFO will want to be included in the consultation process. FPP indicated that if DFO determines that there is a contemplated Crown conduct (*Fisheries Act* Authorization required) we will join into the Provincial process.

Environmental Assessment Requirements

Provincial Environmental Assessment (EA)

It is anticipated that the EA will be registered in June 2018 as a Class 2 undertaking. Class 2 undertakings are typically larger in scale and are considered to have the potential to cause significant environmental impacts and concern to the public. These undertakings require an environmental assessment report and

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formal public review which may include hearings. DFO will participate in the review of the EA as an expert department to comment on potential impacts to fish and fish habitat from the physical impacts of the constriction of the effluent pipe.

CEAA 2012 – Section 67

This would be considered a physical activity in relation to a physical work located on federal lands. This project would meet these criteria. Section 67 responsibilities will be triggered to any Federal Department that issues a regulatory permit, approval or authorization in order for a project to proceed including potentially Transport Canada, Fisheries and Oceans Canada, Environment Canada and Climate Change.

Fisheries Act – Request for Review

FPP sent out a letter requesting information from the proponent in order for FPP to complete the review of the project enabling a decision to which an authorization is required for the project or not.

UBHS – The proponent is planning to carry out this work in April 2018 using an ROV. FPP stated that the ROV survey needs to encompass the footprint of the project and suggested that in areas of interest (hard bottom, macroalgal growth, eelgrass beds, mussel beds, etc.) that the ROV survey those areas to a larger extent to better classify the habitat in the footprint of the project. FPP also suggested that tow cameras or diver surveys may be more appropriate in some areas, depending on the site conditions and limitations. The proponent asked if there was an example of an underwater ROV that they could use to guide their work. FPP suggested that they view Offshore Oil and Gas Projects as they have used an ROV to survey the benthic habitat.

Geotechnical work - The proponent is planning to carry out this work in April 2018 along with the ROV survey. The results of the geotechnical work will determine what construction methodology will be possible for the physical construction of the pipe. FPP suggested that they also consider CHS data and information for benthic substrate types and potential locations for shipwrecks.

Environmental Protection Plan – The proponent wanted to know what level of detail would be required for an EPP for the request for review phase. FPP stated that it does not need a detailed plan until the proponent knows the details of the construction methodology. This would assist FPP in determining what, if any additional mitigation measures should be applied to reduce the impacts to fish and fish habitat.

Offsetting – The proponent asked if the result of the request for review determines that an Authorization is required for the project then what would the offsetting requirements be. FPP stated that we cannot answer that question until we know what the habitat is. Once we know more information we can have more informed discussions. FPP also suggested that the proponent could be proactively looking for offsetting opportunities.

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Smith, Colleen A

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: February-05-18 2:12 PM
To: Smith, Colleen A
Cc: Wambolt, Michael; Jalloh, Rugi; MacPhail, Helen
Subject: RE: Northern Pulp Letter

Hi Colleen,

We have determined that the effluent treatment replacement project requires a Class I EA, and please see the following for further details.

The Northern Pulp facility is considered an undertaking under Schedule A of the *Environmental Assessment Regulations*. The proposed effluent treatment facility is to replace the treatment facility at the existing undertaking. Therefore, the new effluent treatment proposal is considered a modification to an existing undertaking and Nova Scotia Environment has determined that a Class I EA is required, in accordance with Sections 3(2) and 11(3)(b) of the *Environmental Assessment Regulations.* Class I decision options allow for more information and review, if required, through a variety of tools (additional information needed; a focus report that requires more in depth information/analysis on a specific area; an EA report that meets a terms of reference and may be referred to a panel).

If you have further questions, please feel free to give me a call.

Helen Y

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: Smith, Colleen A [mailto:Colleen.Smith@dfo-mpo.gc.ca]
Sent: Monday, February 05, 2018 1:47 PM
To: MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Cc: Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Yeh, Helen X <Helen.Yeh@novascotia.ca>
Subject: RE: Northern Pulp Letter

Hi Helen,

To ensure that our briefings are correct to DFO Senior Management, I need confirmation of the proper designation of the Class Undertaking for the Provincial EA. In accordance with Environmental Assessment Regulations, made under Section 49 of the *Environment Act*, Schedule A

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Class 1 Undertakings:
Industrial facilities:
7. A paper product manufacturing plant

Class 2 Undertakings:
Industrial facilities
3. A pulp mill

Can you confirm what designation this EA would fall under with an explanation of this determination. I would have instinctively thought it is a Class 2 Undertaking.

Thank you,
Colleen
Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosytem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Yeh, Helen X [mailto:Helen.Yeh@novascotia.ca]
Sent: February-05-18 12:14 PM
To: Smith, Colleen A
Subject: RE: Northern Pulp Letter

Hi Colleen, thanks for getting back! I was able to get all the answers from Rugi. Helen.

From: Smith, Colleen A [mailto:Colleen.Smith@dfo-mpo.gc.ca]
Sent: Monday, February 05, 2018 9:47 AM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Subject: RE: Northern Pulp Letter

Hi Helen,

I know that you were talking to Rugi last Friday. Do you have any further questions?

Colleen
Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosytem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Yeh, Helen X [mailto:Helen.Yeh@novascotia.ca]
Sent: February-01-18 3:37 PM

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To: Smith, Colleen A
Subject: FW: Northern Pulp Letter

Hi Colleen,

I have a few questions about the NP's effluent treatment project, and was wondering if you can give me a call. Thanks.

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: McLean, Mark G [mailto:Mark.McLean@dfo-mpo.gc.ca]
Sent: Monday, December 18, 2017 4:10 PM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: Northern Pulp Letter

Helen:

Attached is out letter outlining the information requirements. If you have any questions please contact Colleen Smith. Thanks.

Mark McLean
Manager | Gestionnaire
Fisheries Protection Program | Programme de protection des pêches
Telephone | Téléphone 902-802-0740
Facsimile | Télécopieur 902-426-1489
Mark.McLean@dfo-mpo.gc.ca
Fisheries and Oceans Canada | Pêches et Océans Canada
PO Box 1006, Dartmouth, NS B2Y 4A2
CP 1006, Dartmouth, N-É B2Y 4A2
Government of Canada | Gouvernement du Canada

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Meeting of Fishers of Northumberland Strait (Fishers) & Northern Pulp (NPNS)
Re: Proposed Effluent Treatment Facility Replacement (ETF)
February 8, 2018 – 1 PM – Holiday Inn Express, Stellarton

In Attendance:

[redacted]	– Facilitator, Dillon Consulting Limited
Ron Heighton	– Northumberland Fishermen's Association
Leonard LeBlanc	– Gulf Nova Scotia Fishermen's Coalition
Amy Russell	– Gulf Nova Scotia Fleet Planning Board (Recorder)
Bob Jenkins	– PEI Fishermen's Association
Chuck White	– PEI Fishermen's Association (Southern Kings & Queens)
Melanie Giffin	– PEI Fishermen's Association (Biologist)
Ian MacPherson	– PEI Fishermen's Association
Dennis McGee	– Northumberland Fishermen's Association
Allan MacCarthy	– Northumberland Fishermen's Association
Brendan Doyle	– Gulf Nova Scotia Bonafide Fishermen's Association
[redacted]	– Maritime Fishermen's Union Local 4
Chief Andrea Paul	– Chief, Pictou Landing First Nation
Wayne Denny	– Band Council Member, Pictou Landing First Nation
Derek Francis	– Band Council Member, Pictou Landing First Nation
Marsha Mills	– Pictou Landing First Nation, Fisheries Coordinator
Tracey Denny	– Pictou Landing First Nation, Boat Harbour Remediation Project
Bruce Chapman	– General Manager, Northern Pulp
Terri Fraser	– Technical Manager, Northern Pulp
Kathy Cloutier	– Director of Communications, Paper Excellence
Annemarie Burgess	– Dillon Consulting Limited
Sarah Devereaux	– Dillon Consulting Limited
Corinne Walsh	– EA & Community Relations Coordinator, Northern Pulp (Recorder)

Absent:

Jordan MacDougall	– Inverness South Fishermen's Association
Gordon Beaton	– Maritime Fishermen's Union Local 4
Gary Porter	– Nova Scotia Department of Transportation & Infrastructure (TIR)

1. **Welcome & Introductions**
   - [redacted] facilitator, [redacted] He advised that the best way to persuade others was to listen, then encourage communication to reach resolution. Both the fishing and forest industries need resolution for the future. He stressed his role was to help both industries engage in quality conversation, but that it was the industry representatives present who have authority.
   - All present were invited to introduce themselves (as noted above)
   - The Facilitator thanked Pictou Landing First Nation for hosting this meeting on First Nation Territory. He then invited Ron Heighton and Bruce Chapman to provide opening statements.
   - Mr. Heighton expressed interest in discussing ways in which all could move forward. At the last meeting Fishers were adamant there would be no pipe in the Strait and that position has not changed. The Fishers working group and PLFN Fishers are working side-by-side, along with

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another key player from the Maritime Fishers Association in New Brunswick (however, the representative was unable to attend today). The Fishers in attendance were open to discuss alternative plans and to assist the Consultants & NPNS extract information about the fisheries. The Fishers were willing to share their experience and knowledge, to help build a plan where both the mill and the fisheries can co-exist.

- Mr. Chapman thanked Mr. Heighton and reiterated NPNS' desire to work together, to better understand the fishing industry, and welcomed the Fishers' willingness to help educate all those involved in the proposed project. He looked forward to meaningful dialogue and was here to answer to some of the questions raised at the last meeting.

2. Review action items from December 2017 meeting record

2.1. Receiving Water Study

- At the last meeting, the Receiving Water Study (RWS) wasn't on website. NPNS added the letter and report on the website, and also forwarded it to Ms. Giffin late December. Fishers asked that a separate meeting be set-up to review details of the RWS. NPNS agreed to do so and had suggested that representatives of Stantec be in attendance to answer specific questions. NPNS asked if questions could be provided in the interim.
- Fishers noted that map(s) and information re: commercial, recreational, aboriginal fishing, contained in the RWS were incorrect. The Consultant advised that, with the additional information collected from Fishers, corrected map(s) will be produced.
- Questions were raised re: sources used and the accuracy of their information in the RWS (i.e. weather, high winds, ferry cancellation, etc.) Fishers queried why Fishers or First Nations had not be contacted sooner because they would have provided accurate data. After discussion, it was agreed to focus on working together moving forward.
- Fishers then opened the conversation about time constraints on NPNS/Consultants to do all work necessary for a successful outcome and reiterated that Fishers would accept no less than having all work/studies done properly.
- The Facilitator advised that the timeframe in which to complete the application is outside NPNS/Consultants' control. Everyone present understands that time is running out.
- Discussion then turned to availability to next meet to discuss the RWS. It was agreed to set up a meeting for Tuesday, February 20th, 12:00 to 3:30 pm. It was also agreed that, in advance, Ms. Giffin would forward to NPNS questions to be addressed by Stantec at the meeting.

2.2. Market Analysis

- A question was raised, if NPNS' product is sent to Asia to be made into other products, why does it need to be bleached? The response was that the market wants white pulp. Manufacturers buy NPNS' pulp to blend it (20%) with other products (80%) to strengthen their finished product.
- Discussion ensued re: peroxide bleaching. It is a different process than what is used at the Mill. Peroxide bleaching is not permanent; it is different from whitening. Bleaching is sometimes used at mechanical pulp mills. A question was raised if a change in NPNS's pulp process would affect its final product. NPNS' response was that its customers need a white pulp (not a bleached) to ensure the customers' final product remains white.
- Fishers asked and NPNS agreed to host a tour of the Mill to better understand the Mill's pulp process. A tour can accommodate a maximum of 30 people at one time.

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- After the last meeting, NPNS hired a market analyst to investigate other markets and processes (copies of the full report were available at the meeting for further review).
- NPNS is located in Eastern Canada and has a premier pulp for tissue and paper. NPNS asked what other products could be produced that would generate less effluent:
    - Cement Fibre Board (Unbleached Kraft – UBK) – Coarse fibre would be best for that product (southern pine).
    - Mechanical Pulp Market – Paper Excellence has two mechanical pulp mills – Meadow Lake and Chetwynd. Chetwynd is currently idle due to soft market conditions and saturation. It would not be economically viable for a mechanical pulp mill in Nova Scotia due to electricity costs.
- For the fibre grown in Nova Scotia, Bleached Kraft Pulp (BKP) is the best market for NPNS' resource and business climate. NPNS' customers/partners are in Asia – it is a captured market for tissue, toilet paper, etc.
- In NPNS' pulping process, the mill generates ~85-90% of its own power. If the Mill was to change products, it would have a mill similar to Port Hawkesbury Paper (PHP). Approx. 12-18% of province's energy load is used by PHP.

2.3. Lobster Studies

- At the last meeting it was made clear that the studies were to be conducted 'beyond lobster.' The Consultants have continued to do a lot of study and those findings will be fed into the information going forward. Fishers were encouraged to send any additional studies to NPNS/Consultants so they may be included in the documentation. The Consultants have also been in contact with many researchers of what analyses can/should be done. They will try to support as much as they can moving forward – they don't have answers right now.
- Fishers expressed concerns around doing other work and the time constraints in which to do that work. The Consultants have not yet discussed this.
- Questions were raised re: the location of similar outfalls in the Maritimes. Examples given included Irving (Saint John) which discharges into the Saint John River and PHP which has outfall in the Strait of Canso. PHP operated a chemical pulp mill using elemental chlorine and later chlorine dioxide to bleach the pulp until 1995-1996.
- Discussion then ensued, given the daily volume of effluent with solids, would this not result in an accumulation of slime on the Strait floor? The response was that solids are 98% biodegradable.
- Another concern raised was in relation to the Shell Fish Harvesting Closure zone at Boat Harbour. With the pipe now proposed to go out further into the Strait, would this not potentially increase the size of that closure area? Fishers feel it is very important to know what will be the chemical composition of the effluent to be discharged from the outfall. NPNS explained how that may be difficult because it would be determined by the make-up of the wood being processed on any given day.
- NPNS/Consultants were asked how they plan to submit the project application to the NS Government in July, without a lobster larvae study. A lengthy discussion ensued regarding the natural process involved for female lobsters to release larvae (degrees, external carrying, point of release, etc.) and Fishers were concerned, if the Consultants' researchers have found a way to do this in advance, what would be the possible effects of such an artificial release?
- Consultants advised that they are working with the researchers. They advised that today's conversations were helpful in understanding of limits and information gleaned will be taken

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back to the researchers. Ms. Giffin and Ms. Devereaux (Consultant) to compare lists of consultants to reach consensus of which ones to contact.

- Communication – It was Chief Paul's understanding that all studies were to be delivered to PLFN's legal counsel so that he, in turn, would review with the Band. She expressed concern about not having received hard copies of the RWS, 2016 EEM Report, and the Market Analysis. Mr. Chapman apologized to Chief Paul and advised that such future documentation would be delivered to PLFN's legal counsel.

- Discussion then ensued about the possibility of an exclusion zone and, if so, approximately how large would it be. Questions were raised whether additional studies would be conducted on other species (herring, mackerel, smelts, bass, etc.) The Consultant responded that that determination had not yet been made – at present, the Consultant has information on Lobster. The Consultant will reach out to the researchers re: next step on this matter.
- Fishers issued a reminder that years ago studies were species specific, now we study the ecosystem. We must be careful not to focus only on lobster – it's important to do a full inventory of the ecosystem to look at all species. For instance, keystone species are not commercial, but they are important to the commercial fisheries.

3. Discuss options considered for alternative effluent disposal methods

3.1. Review and discuss criteria used to evaluate options

- Copies of a memo regarding the alternatives considered for the disposal of treated effluent were available for reference.
- Ms. Burgess (Consultant) led the discussion sharing the thought through different options and alternatives; identifying the basics to carrying forward before looking at species or impacts; the practical standpoint of capacity; the viability the Mill to stay open; and environmental protection.
- Fishers were alarmed by the use of "minimize potential impact" under Environmental Protection. They stressed that no amount of impact is acceptable to the risk of their livelihood.
- It was clarified that Pulp & Paper Effluent Regulations (PPER) fall under Federal jurisdiction; other laws and/or regulations fall under Provincial jurisdiction (i.e. municipal treatment).

3.2. Review and discuss possible options

- **1. Trucking the treated effluent:**
  - To handle the capacity of 1,400 loads daily, it would take 16 hrs /day per truck of 100 trucks/hour. From a capacity standpoint, it is not practical. Where the effluent would be transported would be another question (discussed in later option). Factors considered were day-in and day-out loading, movement in and out of the Mill of a large fleet of trucks, wear of road infrastructure, noise, etc.

- **2. Piping on land to an alternate outfall:**
  - Opposed to marine vs. land discharge area – it would be susceptible to weather, additional infrastructure would be needed, additional municipal approvals would be

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required and a new outfall location would be needed. A question was asked if the East or West Rivers could be considered. Relocation of the outfall would require hearing from the communities in which the new location would be proposed.

- **3. Alternate ocean discharge:**
  - Questions were asked about the result of possible ice damage to the diffusers. NPNS advised that effluent entering the pipe would already be treated. Testing results of NPNS' effluent shows better than Federal regulations. Contingency planning is underway by the engineering team.
  - Questions were raised that if damage to diffusers did occur, how quickly the Mill would know and what would be the corrective action? Those questions would be answered by the EA, which will outline monitoring and actions.
  - Methods of monitoring and corrective actions will be determined by the experts. The determination of where the effluent would go and how it would go is important.
  - Testing of effluent and the impact of introducing Oxygen Delignification (O2D) into the pulping process was discussed. The mill tests effluent daily and submits a monthly summary report (daily findings are filed monthly).
  - Fishers inquired about the parameters used for effluent testing (beyond BOD, COD, dioxins & furans) – is testing done for temperature? NPNS will provide a copy of those required under the IA. Environment Canada also conducts random sampling.
  - Discussion then turned to Boat Harbour (Points C & D). EEM is only for 3 years and there appears to be a lot of discrepancies (switching between the two points). NPNS explained that protocols are directed by Environment Canada and they are customized to each mill. The change point for monitoring was made in 2009. The new proposed ETF will not have a 30-day settling period. NPNS suggested that it would be beneficial to set up separate meeting to tour the current ETF.

- **4. Permitted municipal wastewater treatment facility (WWTF):**
  - Discussions then turned to how would we propose to do this: put it through municipal WWTF? Because of the additional capacity needed, this approach would not be practical.
  - Fishers suggested the possibility of splitting capacity between Pictou and New Glasgow. The Consultants advised that the municipalities would bear the burden of meeting Federal PPER regulations.

- **5. Private wastewater treatment facility (WWTF):**
  - Once again, the matter of logistics comes into play – trucking, piping overland, adjusting capacity, available land to do so, etc.

- **6. Land based disposal/irrigation**
  - This would entail taking treated effluent to land that has been permitted for use and discharging it. This has not been approved in Nova Scotia. The challenge with finding lands taking into account the water, soil, seasons, etc.

- **7. Barge to Ocean Discharge:**
  - Approval would have to be sought to do this. Once again, the matter of logistics comes into play (trucking, barges, building a new loading area, etc.)
  - The Fisheries requested more information about this option. Consultants will investigate further and provide their findings back to Ms. Giffin.

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- **8. Discharge anywhere into Pictou Harbour (downstream of causeway):**
  - RWS determined that, due to lack of movement inside of Pictou Harbour, the nutrients would accumulate - therefore, not considered a viable option.

  - It was made clear that the Fishers would officially file their comments with the Government and that comments being shared with NPNS/Consultants during these meetings is not/nor is to be considered their official position.

- **9. Discharge back to Middle River:**
  - Doing so would raise some of the same high-level concerns re: chlorides and minerals. It was removed from the list of options.
  - It the same concern raised about recycling into the mill and its effects on mill equipment – it's the salt that is damaging.
  - Fishers asked if it would be possible to consider combining a number of these options (essentially, splitting the volume of the effluent into a number of areas – i.e. both rivers, and WWTFs in Pictou and New Glasgow) to handle the effluent.

- **10. Discharge to the outlet of Boat Harbour (existing location at point D):**
  - This would go against the *Boat Harbour Act*. The outfall would remain the same, the only difference would be how it travelled to the point D. It is not a viable option.

- **11. Status Quo:**
  - Due to legislation, this option is a non-starter.

3.3. Identify any further areas of review necessary to confirm disposal method options

- Fishers expressed frustration that 50 years ago, a decision was made to allow effluent to be discharged into Boat Harbour and turned it into what it is today. If the proposed new ETF doesn't work, when will this new problem be fixed? Will the Mill be allowed to continue to operate for another 50 years?
- NPNS cannot speak to a decision made 50 years ago.
- NPNS/Consultants were asked what happens now if the fish in the Strait die – what is the back-up plan? It was explained that as part of the EA there will be requirements through the EEM and there will be ongoing monitoring and triggers for action.
- Science never guarantees 100% safety. Science is based on studies/modeling. The Consultants asked, if the project is approved as proposed, what triggers would the Fishers like to see considered. Fishers reiterated that the only acceptable outcome is one that poses zero risk to the Fishing industry.

4. Identify any further areas of review necessary to confirm disposal method options

- The Facilitator stated that NPNS had agreed to provide information requested for review and action in a practical way. NPNS confirmed Stantec's availability for a meeting on February 20th.
- All present were made aware of the process following for the construction of the Confederation Bridge and discussions undertaken by consultants and representatives of the Fisheries from PEI and New Brunswick. It was the understanding of Fishers that losses would be compensated,

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however, no compensation (or in some cases, minimal compensation) was made even though losses had occurred.

- The Facilitator asked if the participants felt positive actions resulted from today's meeting.
- Mr. Heighton was pleased that participants are still engaging, which is positive. The Fishers stance has not changed, and stressed that a solution needs to be found without a pipe going into the Strait. To understand the Fishers position, is to realize a new design must be developed so that we can make sure both industries continue to exist, unharmed. He encouraged Mr. Chapman to call anytime he wished to discuss the project.
- Mr. Chapman too was pleased that all parties continued to discuss things. He thought that today's dialogue was productive and looked forward to future meetings. He still believes that together a solution can be found to ensure the future of both industries.
- Mr. LeBlanc spoke to the major gaps identified in the science. He reiterated the need to focus on ecosystem vs species-specific. He expressed concern that today's agenda/discussions was focused in defence of the pipe vs. other options. He felt NPNS/Consultants had provided more information, but the conclusion is still a pipe. Mr. Chapman spoke frankly that, to date NPNS/Consultants have not yet found solution which does not involve a pipe. NPNS/Consultants continue work on it, are still gathering information, and want to learn more.
- Chief Paul expressed thanks for the invitation to meeting, made through the Fishers. She urged everyone to think beyond science and think of the First Nations and have they have been impacted for the past 50 years. She urged everyone to consider the environment as a whole (not only water, but land and air as well) because the Mill will continue to operate. The cultural aspect must also be taken into account. The First Nations have been here since time immemorial, it has lost and it fears for the future. She expressed disappointment with the day's discussions and was worried that the whole ecosystem is being overshadowed by focus on the fishing industry.
- The Facilitator closed by stating that with small hopeful steps, everyone will begin to feel more confident. NPNS will provide the information requested in today's meeting. Ms. Giffin will forward the questions to NPNS to prep for the next meeting.
- He reflected that conversations regarding risk are difficult conversations. It is important that we continue to share information.

Meeting adjourned at 3:48 PM

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Smith, Colleen A

From: Smith, Colleen A
Sent: February-20-18 2:55 PM
To: Yeh, Helen X; Johnson, Kathleen; Furey, Stefan M; Grant, MT (EC); Jalloh, Rugi; Wambolt, Michael; 'Denning, Allison (HC/SC)'
Cc: MacPhail, Helen; 'Hingston, Michael (EC)'
Subject: RE: peer-reviewed articles

Hello everyone,

Environment and Climate Change Canada is responsible to review the impacts of effluent on fish and fish habitat, therefore, I will leave it to them to respond to your question.

Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosytem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Yeh, Helen X [mailto:Helen.Yeh@novascotia.ca]
Sent: February-16-18 11:10 AM
To: Johnson, Kathleen; Furey, Stefan M; Grant, MT (EC); Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael; 'Denning, Allison (HC/SC)'
Cc: MacPhail, Helen; 'Hingston, Michael (EC)'
Subject: peer-reviewed articles

Hi everyone,

I was wondering if you are aware of any articles/studies (preferably peer-reviewed or government-published) that you can share with me regarding the following: **Do treated pulp mill effluents (from kraft pulp mills using treatment technology similar to the one proposed by Northern Pulp) affect fish and fish habitat?**

The Minister here at NSE would like to gain some background information regarding this topic. I understand the topic title above may be narrowly scoped. If there are other studies or information from other similar pulp mill facilities you think are relevant, please forward my way as well or provide me contact information where I can request the studies/data.

For those of you who are not familiar with the NP proposal, here is some background info. The NP facility is a kraft pulp mill, and NP is proposing to construct a new effluent treatment facility using a new technology called activated sludge treatment (AST). Further project related information (including the receiving water study under the "Project Material" tab on the NP website) is available on the NP website: www.NorthernPulpEffluentTreatmentFacility.ca

It will be much appreciated if you can get back to me by Feb. 23 (Friday) if possible.

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If you have any questions, please feel free to give me a call. Thank you all very much for your assistance in advance!

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

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Smith, Colleen A

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: February-22-18 2:57 PM
To: 'Grant, MT (EC)'; 'Hingston, Michael (EC)'; Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael; McNeill, Alan J; LeBlanc, Jason E; MacLachlan, Geordie R; Feindel, Nathaniel J; Johnson, Kathleen; Furey, Stefan M; 'Denning, Allison (HC/SC)'
Cc: MacPhail, Helen
Subject: Northern Pulp review scope
Attachments: Norther Pulp_review scope_v3.docx

Follow Up Flag: Follow up
Flag Status: Completed

Hi everyone,

Thank you all again for the meeting earlier today!

About the EA review scope (attached), please let me know **if you have further comments by March 1**. Thanks for those who have provided comments already.

About the upcoming presentation/meeting on Pulp & Paper Effluent Regulations and Environmental Effects Monitoring, MT has offered to have their EEM experts in Ottawa provide us a presentation on those topics. I suggest the week of March 12 if that works for everyone. If there are others you would like to invite, please let me know.

MT, please let me know which date that week works the best for the EEM expert. Would 2 hours be ok?

About the site visit, I propose a visit in April when the snow is gone so we can see better. If you are interested, let me know too.

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

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Northern Pulp Effluent Treatment Facility Replacement Project: EA Review Scope related to Water Resources & Fish/Fish Habitat

No	Valued Environmental Components (VEC)	Review Department	
1	Effluent treatment plant (design, operation/maintenance, etc)	NSE, ECCC (in the context of emergency planning & effluent discharge only-)	
2	Freshwater resources (water quality, etc.)	NSE, ECCC~~, DFO (w~~	
3	Marine water resources: examples of review areas -water quality: end-of-pipe discharge criteria, receiving environment, etc.	NSE, ECCC, DFO (receiving environment only)	
4	Fish/fish habitat (impacts of discharge of treated effluents on fish/fish habitat)	ECCC~~,~~ ~~NSFA?~~	
5	Fish & Fish Habitat: examples of review areas -effluent outfall pipe: footprint, design, installation methodology, etc. -impacts on commercial, recreational & Aboriginal fishery	DFO, NSFA	
6	Human health: examples of review areas -risk of consumption of fish contaminated as a result of discharges from project activities (including construction and operation) -risk of exposure to recreational water contaminated as a result of project activities	HC, NSHW~~Department of Health and Wellness~~	
7	Waste management	NSE~~, ECCC~~	
8	Accident & malfunction: examples of review areas -potential for broken outfall pipes, accidental discharge of effluents, etc.	NSE, ECCC	

DFO: Fisheries and Oceans Canada
ECCC: Environment and Climate Change Canada
HC: Health Canada
NSE: Nova Scotia Environment
NSFA: Nova Scotia Department of Fisheries and Aquaculture
NSHW: Nova Scotia Department of Health and Wellness

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February 22, 2018

DRAFT

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Smith, Colleen A

From: Wambolt, Michael
Sent: February-23-18 1:39 PM
To: Smith, Colleen A
Subject: Fw: Northern Pulp and Alton

FYI

Mike Wambolt
902-402-5851

From: Grant, MT (EC) <mt.grant@canada.ca>
Sent: Friday, February 23, 2018 11:35 AM
To: McLean, Mark G
Cc: Wambolt, Michael
Subject: RE: Northern Pulp and Alton

Hi Mark,

Thank you for the email. DFO's role is understood.

MT

From: McLean, Mark G [mailto:Mark.McLean@dfo-mpo.gc.ca]
Sent: February 23, 2018 10:56 AM
To: Grant, MT (EC)
Cc: Wambolt, Michael
Subject: Northern Pulp and Alton

Hi MT. I was speaking with Mike Wambolt and he updated me on the meeting this week on Northern Pulp. I just wanted to clarify DFO's role in the Alton Gas review as there seems to have been some misunderstanding during the meeting.

For the Alton Gas brining process DFO did look at some of the toxicity issues surrounding the potential impacts on the Inner Bay of Fundy population of Atlantic Salmon as this is a species listed as endangered under the Species at Risk Act. As DFO is responsible for aquatic SARA listed species our review included all potential impacts include impacts from possible brine exposure. For other species, such as striped bass, DFO provided the timing of when sensitive life stages of the species would be present. For Northern Pulp we are not aware of any aquatic SARA that are likely to be impacted by effluent but will make this assessment during our review. As always, DFO can provide ECCC information on fish species likely present near the outfall but the department will not provide any analysis of toxicity issues as these are regulated by ECCC.

Please give me a call if you have any questions. Thanks.

Mark McLean
Manager | Gestionnaire
Fisheries Protection Program | Programme de protection des pêches
Telephone | Téléphone 902-802-0740

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Facsimile | Télécopieur 902-426-1489
Mark.McLean@dfo-mpo.gc.ca
Fisheries and Oceans Canada | Pêches et Océans Canada
PO Box 1006, Dartmouth, NS B2Y 4A2
CP 1006, Dartmouth, N-É B2Y 4A2
Government of Canada | Gouvernement du Canada

If you have received this communication by mistake, please notify the sender immediately and delete the communication without printing, copying or forwarding it. Thank you.
Si vous avez reçu cette communication par erreur, veuillez en aviser l'expéditeur immédiatement et la supprimer sans l'imprimer, la copier, ou la faire suivre. Merci.

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Smith, Colleen A

From: Nurse, Stacey
Sent: March-02-18 3:04 PM
To: Smith, Colleen A
Subject: FW: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation
Attachments: 180227 Northern Pulp Designation Request.pdf; Request for Designation - Request for Information from FRT.docx

Follow Up Flag: Follow up
Flag Status: Completed

One attachment provided elsewhere on file

From: Maclean,Lachlan [CEAA/ACEE] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: March-02-18 1:03 PM
To: Nurse, Stacey
Subject: FW: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation

Hi Stacey

I sent this to Roger Johnson on Tuesday but he just called and taught me that NL has a separate DFO office than the Maritimes so I'm sending along to you (I hope you are the right person!). Since this is late getting to you I'm extending the requesting date in case you need it:

The Agency has received a request from a member of the public to designate the Northern Pulp Replacement Effluent Project (the Project) for a federal environmental assessment under subsection 14(2) of CEAA 2012. When such requests are received, the Agency advises and assists the Minister of Environment and Climate Change Canada on the use of her authority to require an environmental assessment of a project not identified in the Regulations pursuant to CEAA 2012.

As part of our analysis of the Project, the Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All available information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home. No provincial registration document is expected until later in the spring or early summer.

The Agency requests your response to the questions provided in the attachment no later than **March 23, 2018.**

Thanks,
Lauchie

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

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Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

Government of Canada Gouvernement du Canada

Canada

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February 27, 2018

ELECTRONIC

Dear Federal Colleagues,

The Canadian Environmental Assessment Agency (the Agency) is aware of the Northern Pulp Replacement Effluent Treatment Facility Project (the Project) in Pictou County, NS, that is being proposed by Northern Pulp Nova Scotia Corporation (the proponent), a subsidiary of BC-based Paper Excellence Group.

The Agency has determined that the Project as proposed does not meet the definition of a designated project under the *Regulations Designating Physical Activities* (the Regulations) pursuant to the *Canadian Environmental Assessment Act,* 2012 (CEAA 2012).

In cases where a proposed project is not identified in the Regulations or is below the prescribed threshold, the Minister may designate the project for the purpose of requiring an environmental assessment under subsection 14(2) of CEAA 2012 if, in the Minister's opinion, the carrying out of the project has the potential to cause adverse environmental effects or public concerns related to those effects may warrant the designation. Additional information regarding the process for designation requests received by the Agency can be found at: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/designating-project-under-canadian-environmental-assessment-act-2012.html.

The Agency received a request from a member of the public to designate the Project for a federal environmental assessment under subsection 14(2) of CEAA 2012. The request expressed concern for the Project to impact the local fishery and tourism. The Agency advises and assists the Minister on the use of her authority to require an environmental assessment of a project not identified in the Regulations pursuant to CEAA 2012. In developing a recommendation for the Minister, the Agency takes into account a number of matters including whether there is **potential** for the Project to cause adverse environmental effects within federal jurisdiction as set out in section 5 of CEAA 2012, and the anticipated nature of those effects.

The Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home.

The Agency requests your response to the following questions no later than **March 19, 2018**:

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

Questions:

1. Indicate whether the description of the Project presented on the project website is sufficient in characterizing project effects to the components of the environment, as defined under section 5 of CEAA 2012, that relate to your mandate, including whether these effects may be adverse.

2. Identify any additional potential adverse environmental effects of the Project that are not described on the project website and their linkage to components of the environment under federal jurisdiction (as defined under section 5 of CEAA 2012).
    a. Identify whether any potential adverse environmental effects are likely to be significant in nature; and
    b. Comment on whether any potential adverse effects identified could be managed by existing regulatory processes.

3. List the potential powers, duties, or functions that your department may issue to enable the Project to proceed, why they might be issued, and which project components and activities are related to the powers, duties, or functions.

4. Identify the potential environmental effects, associated with that power, duty or function identified above, as described in subsection 5(2) of CEAA 2012. Please include in your response a description of the scope or extent (i.e. project activities addressed and components of the environment included) under this power, duty or function.

5. Has your department or agency already exercised the above-noted power or performed a duty or function to enable the proposed Project to proceed in whole or in part? If yes, please describe.

The Agency will review the Project and its potential environmental effects, and reflect the information you provide in its recommendation to the Minister on whether the Project should be designated.

Further questions regarding this request can be directed to Lachlan MacLean at **902-426-8697** or by email at **Lachlan.maclean**@ceaa.acee.gc.ca.

Yours Sincerely,

Lachlan MacLean
Project Manager, **Atlantic**

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Smith, Colleen A

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: March-07-18 10:45 AM
To: 'Grant, MT (EC)'; 'Hingston, Michael (EC)'; Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael; McNeill, Alan J; LeBlanc, Jason E; MacLachlan, Geordie R; Feindel, Nathaniel J; Johnson, Kathleen; Furey, Stefan M; 'Denning, Allison (HC/SC)'
Cc: MacPhail, Helen
Subject: FW: Northern Pulp review scope
Attachments: Norther Pulp_review scope_final.docx

Follow Up Flag: Follow up
Flag Status: Completed

Hi folks,

About the Northern Pulp effluent treatment proposal, attached is the final version of the review scope & roles of each department, related to fish/fish habitat and water resources for your record.

Note that this does not limit you from commenting on additional areas of concerns (that may be missed in the attached document) during the upcoming EA process.

Thanks you all again,

Helen

From: Yeh, Helen X
Sent: Thursday, February 22, 2018 2:57 PM
To: 'Grant, MT (EC)' <mt.grant@canada.ca>; 'Hingston, Michael (EC)' <michael.hingston@canada.ca>; 'Jalloh, Rugi' <Rugi.Jalloh@dfo-mpo.gc.ca>; 'Smith, Colleen A' <Colleen.Smith@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; McNeill, Alan J <Alan.McNeill@novascotia.ca>; LeBlanc, Jason E <Jason.LeBlanc@novascotia.ca>; MacLachlan, Geordie R <Geordie.MacLachlan@novascotia.ca>; Feindel, Nathaniel J <Nathaniel.Feindel@novascotia.ca>; Johnson, Kathleen <Kathleen.Johnson@novascotia.ca>; Furey, Stefan M <Stefan.Furey@novascotia.ca>; 'Denning, Allison (HC/SC)' <allison.denning@canada.ca>
Cc: MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Subject: Northern Pulp review scope

Hi everyone,

Thank you all again for the meeting earlier today!

About the EA review scope (attached), please let me know **if you have further comments by March 1**. Thanks for those who have provided comments already.

About the upcoming presentation/meeting on Pulp & Paper Effluent Regulations and Environmental Effects Monitoring, MT has offered to have their EEM experts in Ottawa provide us a presentation on those topics. I suggest the week of March 12 if that works for everyone. If there are others you would like to invite, please let me know.

MT, please let me know which date that week works the best for the EEM expert. Would 2 hours be ok?

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About the site visit, I propose a visit in April when the snow is gone so we can see better. If you are interested, let me know too.

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

<Norther Pulp_review scope_v3.docx>

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Northern Pulp Effluent Treatment Facility Replacement Project: EA Review Scope related to Water Resources & Fish/Fish Habitat

No	Valued Environmental Components (VEC)	Review Department
1	Effluent treatment plant (design, operation/maintenance, etc)	NSE, ECCC (in the context of emergency planning & effluent discharge only)
2	Freshwater resources (water quality, etc.)	NSE, ECCC
3	Marine water resources: examples of review areas -water quality: end-of-pipe discharge criteria, receiving environment, etc.	NSE, ECCC, DFO (receiving environment only)
4	Fish/fish habitat (impacts of discharge of treated effluents on fish/fish habitat)	ECCC
5	Fish & Fish Habitat: examples of review areas -effluent outfall pipe: footprint, design, installation methodology, etc. -impacts on commercial, recreational & Aboriginal fishery	DFO, NSFA
6	Human health: examples of review areas -risk of consumption of fish contaminated as a result of discharges from project activities (including construction and operation) -risk of exposure to recreational water contaminated as a result of project activities	HC
7	Waste management	NSE
8	Accident & malfunction: examples of review areas -potential for broken outfall pipes, accidental discharge of effluents, etc.	NSE, ECCC

DFO: Fisheries and Oceans Canada
ECCC: Environment and Climate Change Canada
HC: Health Canada
NSE: Nova Scotia Environment
NSFA: Nova Scotia Department of Fisheries and Aquaculture

February 22, 2018

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Smith, Colleen A

From: Smith, Colleen A
Sent: March-09-18 1:25 PM
To: Maclean,Lachlan [CEAA/ACEE]
Cc: Jalloh, Rugi
Subject: RE: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation
Attachments: Request for Designation - Request for Information from FRT_DFO.pdf

Hello Lachlan,

Please find attached DFO's response to the questions posed by the CEAA. I would appreciate an update from you on CEAA's determination to carry out an environmental assessment over and above the CEAA, Section 67 requirements.

If you have any further questions please let me know.
Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosytem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Nurse, Stacey
Sent: March-02-18 2:31 PM
To: Maclean,Lachlan [CEAA/ACEE]
Cc: Smith, Colleen A
Subject: RE: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation

Lachlan,

I believe Colleen Smith is the contact for this file. I have copied her in on this response so that you have her contact info.

Thanks,

Stacey Nurse
Fisheries Protection Biologist, Ecosystem Management
Fisheries and Oceans Canada/Government of Canada

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Stacey.Nurse@dfo-mpo.gc.ca/ Tel: 902-401-1811

Biologiste de Protection des Pêches, Gestion des écosystèmes
Pêches et Océans Canada/Gouvernement du Canada
Stacey.Nurse@dfo-mpo.gc.ca/ Tél.: 902-401-1811

If you have received this communication by mistake, please notify the sender immediately and delete the communication without printing, copying or forwarding it. Thank you.

Si vous avez reçu cette communication par erreur, veuillez en aviser l'expéditeur immédiatement et la supprimer sans l'imprimer, la copier, ou la faire suivre. Merci.

From: Maclean,Lachlan [CEAA/ACEE] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: March-02-18 1:03 PM
To: Nurse, Stacey
Subject: FW: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation

Hi Stacey

I sent this to Roger Johnson on Tuesday but he just called and taught me that NL has a separate DFO office than the Maritimes so I'm sending along to you (I hope you are the right person!). Since this is late getting to you I'm extending the requesting date in case you need it:

The Agency has received a request from a member of the public to designate the Northern Pulp Replacement Effluent Project (the Project) for a federal environmental assessment under subsection 14(2) of CEAA 2012. When such requests are received, the Agency advises and assists the Minister of Environment and Climate Change Canada on the use of her authority to require an environmental assessment of a project not identified in the Regulations pursuant to CEAA 2012.

As part of our analysis of the Project, the Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All available information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home. No provincial registration document is expected until later in the spring or early summer.

The Agency requests your response to the questions provided in the attachment no later than **March 23, 2018**.

Thanks,
Lauchie

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

No information has been removed or severed from this page

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Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

Government of Canada | Gouvernement du Canada

Canada

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

February 27, 2018

ELECTRONIC

Dear Federal Colleagues,

The Canadian Environmental Assessment Agency (the Agency) is aware of the Northern Pulp Replacement Effluent Treatment Facility Project (the Project) in Pictou County, NS, that is being proposed by Northern Pulp Nova Scotia Corporation (the proponent), a subsidiary of BC-based Paper Excellence Group.

The Agency has determined that the Project as proposed does not meet the definition of a designated project under the *Regulations Designating Physical Activities* (the Regulations) pursuant to the *Canadian Environmental Assessment Act,* 2012 (CEAA 2012).

In cases where a proposed project is not identified in the Regulations or is below the prescribed threshold, the Minister may designate the project for the purpose of requiring an environmental assessment under subsection 14(2) of CEAA 2012 if, in the Minister's opinion, the carrying out of the project has the potential to cause adverse environmental effects or public concerns related to those effects may warrant the designation. Additional information regarding the process for designation requests received by the Agency can be found at: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/designating-project-under-canadian-environmental-assessment-act-2012.html.

The Agency received a request from a member of the public to designate the Project for a federal environmental assessment under subsection 14(2) of CEAA 2012. The request expressed concern for the Project to impact the local fishery and tourism. The Agency advises and assists the Minister on the use of her authority to require an environmental assessment of a project not identified in the Regulations pursuant to CEAA 2012. In developing a recommendation for the Minister, the Agency takes into account a number of matters including whether there is **potential** for the Project to cause adverse environmental effects within federal jurisdiction as set out in section 5 of CEAA 2012, and the anticipated nature of those effects.

The Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home.

The Agency requests your response to the following questions no later than **March 19, 2018**:

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

Questions:

1. Indicate whether the description of the Project presented on the project website is sufficient in characterizing project effects to the components of the environment, as defined under section 5 of CEAA 2012, that relate to your mandate, including whether these effects may be adverse.

   The description of the project presented on the project website does not include project effects to the components of the environment, as defined under section 5 of CEAA. For Fisheries and Oceans Canada (DFO), this would include:

- A change to fish and habitat as defined in subsection 2(1) of the *Fisheries Act* as a result of the physical works associated with the construction of the pipe outfall.
- A change to aquatic species as defined in subsection 2(1) of the *Species at Risk Act,* from both the physical works associated with the construction of the pipe outfall.

   If DFO becomes a Federal Authority through Section 67 or a full federal Environmental Assessment, there would be a shared mandate with other Federal Authorities to determine:

- A change that may be caused to the environment that would occur on federal lands, in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out.
- With respect to Aboriginal peoples, if there will be any change that may be caused to the environment on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
- With respect to broader changes in health and socio-economic conditions for fishermen, in particular.

   DFO has requested additional information about the construction of the pipeline from the proponent so that a determination can be made as to what the physical impacts of the project will be to fish and fish habitat and aquatic species at risk.

2. Identify any additional potential adverse environmental effects of the Project that are not described on the project website and their linkage to components of the environment under federal jurisdiction (as defined under section 5 of CEAA 2012).

   a. Identify whether any potential adverse environmental effects are likely to be significant in nature; and

      The project is not anticipated to have significant adverse effects related to DFO's mandate under the *Fisheries Act* or *Species at Risk Act*.

   b. Comment on whether any potential adverse effects identified could be managed by existing regulatory processes.
      The physical works form the installation of the outfall pipe could impact fish and fish habitat. These effects could likely be managed through DFO's existing regulatory process.

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3. List the potential powers, duties, or functions that your department may issue to enable the Project to proceed, why they might be issued, and which project components and activities are related to the powers, duties, or functions.

- DFO's role, pursuant to Section 35 of the *Fisheries Act*, is to review physical impacts from proposed construction projects to determine if there could be serious harm to fish that are part of or support commercial, recreational or Aboriginal fisheries.
    - In May 2017, the Department received a *Request for Review* application from Northern Pulp for the construction of a new submerged outfall pipe.
    - On November 1st, 2017, DFO sent a letter requesting additional information to the proponent in order to complete the review of the project. DFO is currently awaiting the additional information including detailed design in order to complete our review. It is anticipated that an underwater benthic survey will be conducted in spring 2018. This information will inform the preferred methodology for the construction of the pipe (e.g. trench, direct placement on seafloor) that will also inform the regulatory process that will be required by DFO.

4. Identify the potential environmental effects, associated with that power, duty or function identified above, as described in subsection 5(2) of CEAA 2012. Please include in your response a description of the scope or extent (i.e. project activities addressed and components of the environment included) under this power, duty or function.

    - Pursuant to Section 35 of the *Fisheries Act*, DFO is to review physical impacts from proposed construction of the pipe outfall to determine if there could be serious harm to fish. DFO will be reviewing the impacts to fish and fish habitat that are part of or that support commercial, recreational or Aboriginal (CRA) fisheries. This review will be limited to physical footprint of the construction activities and the CRA fisheries in proposed footprint of the pipe outfall.
    - It is unlikely that there would be adverse effects to aquatic species at risk.

5. Has your department or agency already exercised the above-noted power or performed a duty or function to enable the proposed Project to proceed in whole or in part? If yes, please describe.
    - No, DFO is currently awaiting information to determine if a *Fisheries Act* Authorization will be required.
    - If DFO determines that an authorization is required for the physical works associated with the construction of the pipe, DFO would participate as a Federal Authority under the applicable CEAA 2012 process.

The Agency will review the Project and its potential environmental effects, and reflect the information you provide in its recommendation to the Minister on whether the Project should be designated.

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Further questions regarding this request can be directed to Lachlan MacLean at **902-426-8697** or by email at **Lachlan.maclean**@ceaa.acee.gc.ca.

Yours Sincerely,

Lachlan MacLean
Project Manager, **Atlantic**

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Wambolt, Michael

From: McLean, Mark G
Sent: March-09-18 9:52 AM
To: Wambolt, Michael
Subject: RE: CEAA and Northern Pulp

I gave Colleen my comments, thanks.

Mark

From: Wambolt, Michael
Sent: March-09-18 8:23 AM
To: McLean, Mark G
Subject: CEAA and Northern Pulp

Hi Mark
As discussed the other day we received a request from CEAA regarding the Northern Pulp project. Colleen has drafted and I conducted some minor edits to the document but I would appreciate having your opinion on this before you leave.

W:\Referrals and EA's\2017 Referrals and EAs\Pictou\17-G-193 Northern Pulp Nova Scotia Effluent Replacement Project\CEAA\Request for Designation - Request for Information from FRT DFO MW REVIEW.docx

Could you have a quick review of the questions and see if we are missing anything?

Thanks,

Mike Wambolt
Section Head
Marine, Mining, Oil and Gas
902-402-5851

Fisheries Protection Program | Programme de Protection des Pêches
Ecosystem Management | Gestion des Ecosystemes
Maritimes Region | Region des Maritimes
Fisheries and Oceans Canada | Pêches et Océans Canada
Government of Canada | Gouvernement du Canada
PO Box 1006, Station B410, Dartmouth, NS B2Y 4A2 | CP 1006, Station B410, Dartmouth, N-É B2Y 4A2

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

February 27, 2018

ELECTRONIC

Dear Federal Colleagues,

The Canadian Environmental Assessment Agency (the Agency) is aware of the Northern Pulp Replacement Effluent Treatment Facility Project (the Project) in Pictou County, NS, that is being proposed by Northern Pulp Nova Scotia Corporation (the proponent), a subsidiary of BC-based Paper Excellence Group.

The Agency has determined that the Project as proposed does not meet the definition of a designated project under the *Regulations Designating Physical Activities* (the Regulations) pursuant to the *Canadian Environmental Assessment Act,* 2012 (CEAA 2012).

In cases where a proposed project is not identified in the Regulations or is below the prescribed threshold, the Minister may designate the project for the purpose of requiring an environmental assessment under subsection 14(2) of CEAA 2012 if, in the Minister's opinion, the carrying out of the project has the potential to cause adverse environmental effects or public concerns related to those effects may warrant the designation. Additional information regarding the process for designation requests received by the Agency can be found at: https://www.canada.ca/en/environmental-assessment-agency/services/policy-guidance/designating-project-under-canadian-environmental-assessment-act-2012.html.

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The Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home.

The Agency requests your response to the following questions no later than **March 19, 2018**:

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Questions:

1. Indicate whether the description of the Project presented on the project website is sufficient in characterizing project effects to the components of the environment, as defined under section 5 of CEAA 2012, that relate to your mandate, including whether these effects may be adverse.

   The description of the project presented on the project website does not include project effects to the components of the environment, as defined under section 5 of CEAA. For Fisheries and Oceans Canada (DFO), this would include:

- A change to fish and habitat as defined in subsection 2(1) of the *Fisheries Act* as a result of the physical works associated with the construction of the pipe outfall.
- A change to aquatic species as defined in subsection 2(1) of the *Species at Risk Act,* from both the physical works associated with the construction of the pipe outfall and the impacts from the effluent.

Comment [MW1]: Not sure we need to refer to SARA?

   If DFO becomes a Federal Authority through Section 67 or a full federal Environmental Assessment, there would be a shared mandate with other Federal Authorities to determine:

- A change that may be caused to the environment that would occur on federal lands, in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out.
- With respect to Aboriginal peoples, if there will be any change that may be caused to the environment on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes, or any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.
- With respect to broader changes in health and socio-economic conditions for fishermen, in particular.

   DFO has requested additional information from the proponent so that a determination can be made as to what the effects will be to fish and fish habitat and aquatic species at risk.

2. Identify any additional potential adverse environmental effects of the Project that are not described on the project website and their linkage to components of the environment under federal jurisdiction (as defined under section 5 of CEAA 2012).
   a. Identify whether any potential adverse environmental effects are likely to be significant in nature; and

      The project is not anticipated to have significant adverse effects related to DFO's mandate under the Fisheries Act or Species at Risk Act.

   b. Comment on whether any potential adverse effects identified could be managed by existing regulatory processes.

s.21(1)(a)
s.21(1)(b)
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The physical works form the installation of the outfall pipe could impact fish and fish habitat. These effects could likely be managed through DFO's existing regulatory process.

3. List the potential powers, duties, or functions that your department may issue to enable the Project to proceed, why they might be issued, and which project components and activities are related to the powers, duties, or functions.

- DFO's role, pursuant to Section 35 of the *Fisheries Act*, is to review physical impacts from proposed construction projects to determine if there could be serious harm to fish that are part of or support commercial, recreational or Aboriginal fisheries.
    - In May 2017, the Department received a *Request for Review* application from Northern Pulp for the construction of a new submerged outfall pipe.
    - On November 1st, 2017, DFO sent a letter requesting additional information to the proponent in order to complete the review of the project. DFO is currently awaiting the additional information including detailed design in order to complete our review. It is anticipated that an underwater benthic survey will be conducted in Spring 2018. This information will inform the preferred methodology for the construction of the pipe (e.g. trench, direct placement on seafloor) that will also inform the regulatory process that will be required by DFO.

4. Identify the potential environmental effects, associated with that power, duty or function identified above, as described in subsection 5(2) of CEAA 2012. Please include in your response a description of the scope or extent (i.e. project activities addressed and components of the environment included) under this power, duty or function.

- Pursuant to Section 35 of the *Fisheries Act*, DFO is to review physical impacts from proposed construction of the pipe outfall to determine if there could be serious harm to fish. DFO will be reviewing the impacts to fish and fish habitat that are part of or that support commercial, Aboriginal or recreational fisheries. This review will be limited to physical footprint of the construction activities and the CRA fisheries in proposed footprint of the pipe outfall.
- It is unlikely that there would be adverse effects to aquatic species at risk (physical works or effluent).

5. Has your department or agency already exercised the above-noted power or performed a duty or function to enable the proposed Project to proceed in whole or in part? If yes, please describe.
    - No, DFO is currently awaiting information to determine if a *Fisheries Act* Authorization will be required.
    - If DFO determines that an authorization is required for the physical works associated with the construction of the pipe, DFO would participate as a Federal Authority under the applicable CEAA 2012 process.

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The Agency will review the Project and its potential environmental effects, and reflect the information you provide in its recommendation to the Minister on whether the Project should be designated.

Further questions regarding this request can be directed to Lachlan MacLean at **902-426-8697** or by email at **Lachlan.maclean**@ceaa.acee.gc.ca.

Yours Sincerely,

Lachlan MacLean
Project Manager, **Atlantic**

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DILLON CONSULTING

NORTHERN PULP NOVA SCOTIA

Replacement Effluent Treatment Facility

Information Submission to CEAA

April 2018

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

Executive Summary

Northern Pulp Nova Scotia Corporation (NPNS), located in Pictou County, Nova Scotia has been in operation since 1967 manufacturing premium northern bleached softwood Kraft (NBSK) pulp. As is typical of NBSK pulping processes, NPNS produces wastewater ('effluent') as a by-product of its industrial process.

NPNS' effluent is currently treated in the Boat Harbour Effluent Treatment Facility (BHETF). Effluent from the mill is piped under the East River to the BHETF, where it is ultimately discharged into the Northumberland Strait. The BHETF is owned by the Province of Nova Scotia and has been operated by NPNS under lease since 1996. Prior to 1996, the facility was owned and operated by the Province of Nova Scotia. The introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, will prohibit the use of the provincially owned facility for the reception and treatment of effluent after January 31, 2020. It is the wish of Pictou Landing First Nation that Boat Harbour be returned to its original tidal state and made a place that the community can once again enjoy. NPNS is supportive of the government's promise made to Pictou Landing First Nation.

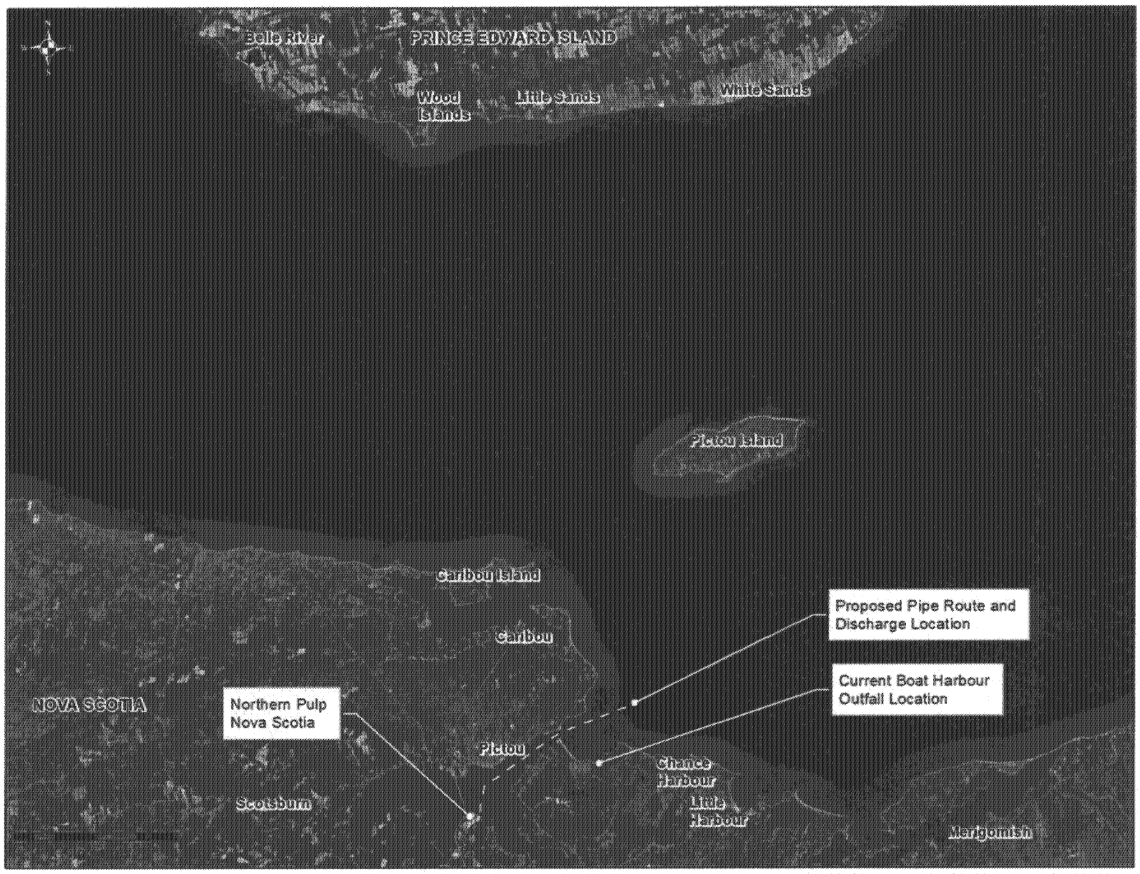
Proposed Project

A replacement ETF and a new outfall are required to treat the facility's effluent and will offer significant environmental benefits compared to current operations. The proposed replacement treatment facility will be a modern Activated Sludge (AST) system as opposed to the BHETF which operates an Aerated Stabilization Basin (ASB) system. The new AST facility will comfortably meet the Pulp and Paper Effluent Regulations (PPER) currently in place. Biochemical Oxygen Demand (BOD5) and Total Suspended Solids (TSS) will continue to be less than 25% of the mill's current PPER limits. The new AST system will result in removal efficiency for Chemical Oxygen Demand (COD) and will discharge effluent of lower colour into the Northumberland Strait than the current BHETF. Nutrient loading to the Northumberland Strait will also be reduced. Dioxin and Furan testing in recent years has shown that NPNS is currently non-detect for compounds tested under PPER and continued compliance with the Dioxins and Furans regulations is anticipated.

There are several in-plant upgrades proposed subsequent to the ETF project which are anticipated to further improve effluent quality, including the addition of a $70 million project to install an Oxygen Delignification System will lead to a reduction of 30 – 40% in Chlorine Dioxide bleaching requirements. The process will result in significant environmental improvements through further reductions in COD and Adsorbable Organic Halides (AOX). The environmental improvements resulting from in-mill upgrades are not included as part of the EA and will occur subsequent to the commissioning of the proposed ETF. In this way, the EA is additionally assessing a conservative design scenario.

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An approximately 10 km long pipeline discharging through a six-port engineered diffuser is being proposed located approximately 3.5 km away from the existing outfall location in the Northumberland Strait.



The Receiving Water Study (RWS) completed for this project assessed alternative locations for the outfall. The RWS found. It is necessary to extend the pipeline into the Northumberland Strait as all locations evaluated within the Pictou Harbour exhibited flow characteristics that that resulted in poor dilution and mixing. Of all the alternatives modelled, the location chosen provided the best dilution and mixing and thus the lowest potential for long-term cumulative effects on the fishery and socio-economic environments. It also satisfied another key criterion during the selection of the preferred location of the outfall: the development of a solution that does not impact Boat Harbour in the future tidal state. The diffuser was designed to meet key guidelines established based on a Canadian Council of Ministers of the Environment (CCME) process and to meet background concentrations of the receiving water in less than 100 m from the outfall. Marine geotechnical and video-type marine habitat studies are underway (beginning April 2018) to assist in determining the exact routing of the outfall discharge pipe and diffuser location.

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Additional modeling was undertaken to assess the current conditions and included the current outfall from the Boat Harbour Basin (not tidal, not diffused). Videos provided with the submission clearly show the benefits of diffusing effluent prior to discharge.

Engagement

Pictou Landing First Nation has been engaged by the Province of Nova Scotia in Formal Consultation since March 2017 with respect to the conceptual and preliminary design of the replacement treatment facility, prior to the initiation of this Environmental Assessment. The proponent was included at meetings with Pictou Landing First Nation, NS Office of Aboriginal Affairs, and NS Transportation and Infrastructure Renewal held in April, August and November 2017.

Within the pre-registration process, Northern Pulp has held itself to a high standard of care. The Nova Scotia EA process makes it the responsibility of the proponent to adequately engage First Nations, community and stakeholders, and address feedback received. Understanding the significance of this project, NPNS has undertaken extensive engagement throughout the Provincial Environmental Assessment Pre-Registration Process anticipated to run approximately 210 days (Winter 2017 – Summer 2018).

Approximately 20,000 project initiation newsletters were distributed, generating over 750 attendees at project open houses held in December alone. The project website has seen 2,000 distinct users visit. Interest and feedback has been heard from across the Atlantic Provinces. Representatives from fishing associations in PEI and New Brunswick have also joined the conversation. When invited, the Proponent presented to the PEI Legislative Standing Committee for Agriculture and Fisheries in Charlottetown.

As outlined in the following document, extensive communication and feedback has been facilitated via a unique EA study website, direct response letters, public open house information centres, stakeholder, government meetings and First Nations community engagement. Input received has shaped the project and EA studies undertaken. For example, a market study was undertaken to address the closed loop effluent question arising from the fishers and confirm that altering the product produced at NPNS is not a viable economical alternative to an effluent outfall. In addition, a study was commissioned with a lobster expert to assess the impact of effluent to the lobster fishery.

Across all discussions and feedback received, a consistent set of themes have been identified that focus around protection of the socio-economic and marine environments.

Recognizing the importance of understanding the needs of each agency at the provincial EA stage and future permitting stage, agencies consulted to date include:

- Nova Scotia Environment
- Nova Scotia Department of Natural Resources
- Nova Scotia Office of Aboriginal Affairs

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- Department of Fisheries and Oceans, Canada
- Transportation Canada
- Environment and Climate Change Canada
- Health Canada

The above noted government agencies have been updated throughout the pre-registration process; this too will continue leading up to registration of the EA.

A second wide-ranging series of public information open house sessions are scheduled to be held June 2018 to summarize project updates and present the EA studies conducted. This will provide the public, First Nations, stakeholders and government another chance for engagement and review.

Science and Studies

Impact assessments are in progress. No significant effects are expected from the construction, operation, and maintenance of the proposed facility based on preliminary results and incorporation of standard mitigation measures and appropriate design planning. The provincial assessment will address key areas such as Fish and Fish Habitat, Migratory Birds, Species At Risk, federal lands, socio-economic and Indigenous Peoples.

Studies that have been conducted or are currently underway include:

- Receiving Water Studies (current and future conditions)
- Land Archeology
- Bird Studies
- Evaluation of potential impact on Lobster
- Marine Habitat Assessment
- Marine Archeological Assessment
- Marine Geotechnical Assessment
- Species at Risk Review
- Air Quality Modeling - related to TRS (odour) and Power Boiler sludge burning
- Planning for future Environmental Effects Monitoring (EEM)
- MEKS – Mi'kmaq Ecological Knowledge Study
- Wetland Investigations
- Noise Impact Assessment
- Human Health Evaluation
- Market Study for Bleached Kraft Pulp

The impact assessments underway in the NS Provincial EA process will result in a thorough understanding of the project and its potential effects. Appropriate mitigations as well as regulatory requirements, and public, stakeholder, and First Nations interests are being incorporated into the project.

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Closing

NPNS is currently undertaking a Nova Scotia Class 1 EA assessment. That, along with subsequent permitting/approval applications, will address federal jurisdiction and CEAA components. The attached document provides extensive technical, scientific and general information outlining the process and information obtained thus far.

This project does not meet the scale of impact nor resemble projects identified on the CEAA designated project list. The provincial EA and subsequent permitting/approval processes address the potential for effects and provides framework to support the project team in developing a complete approach. As corporate citizens who continue to strive to reduce their environmental footprint, and are committed to the continued success of both the forestry and fishing industries in Nova Scotia, NPNS thanks CEAA for its attention to this important project.

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A Preliminary Engineering for Effluent Treatment Facility Replacement – Technology Selection Summary

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C Receiving Water Study

D Environmental Effects Monitoring, Cycle 7

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F What We Heard

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H Engagement Materials

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1.0 Purpose

The Canadian Environmental Assessment Agency (CEAA) has been requested by the public to review the environmental assessment (EA) designation for the proposed replacement effluent treatment facility project for the Northern Pulp Nova Scotia Corporation (NPNS) pulp mill. CEAA previously determined (correspondence dated May 16, 2017) that the proposed undertaking did not appear to involve activities that would be considered to be a designated project under the *Canadian Environmental Assessment Act* (CEAA 2012) Regulation Designating Physical Activities.

The following is intended to provide CEAA with information to allow the Agency to review the project and its potential effects and make a recommendation to the Minister of Environment and Climate Change Canada (ECCC) on whether the project should be designated (correspondence dated February 23, 2018).

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2.0 Introduction

The NPNS pulp mill is located at Abercrombie Point facing Pictou Harbour in Pictou County, Nova Scotia (**Figure 1**). A replacement of the existing effluent treatment facility is being proposed that would see the main facility constructed on NPNS property. A discharge pipe would be constructed from the facility, along the bottom of Pictou Harbour (estuary environment), to the recommended outfall location in the Northumberland Strait (marine environment).

NPNS manufactures northern bleached softwood kraft (NBSK), more commonly referred to as kraft pulp. As a result of access to Eastern Canadian spruce and fir fibres and other unique conditions in Nova Scotia, pulp from NPNS is recognized as premium reinforcement pulp (PRP) due to its high quality and strength. Customers from around the world purchase pulp from NPNS to manufacture common household products such as tissue, paper towel and writing paper. The geographic location in the northern hemisphere and access to spruce and balsam fir make NPNS globally competitive.

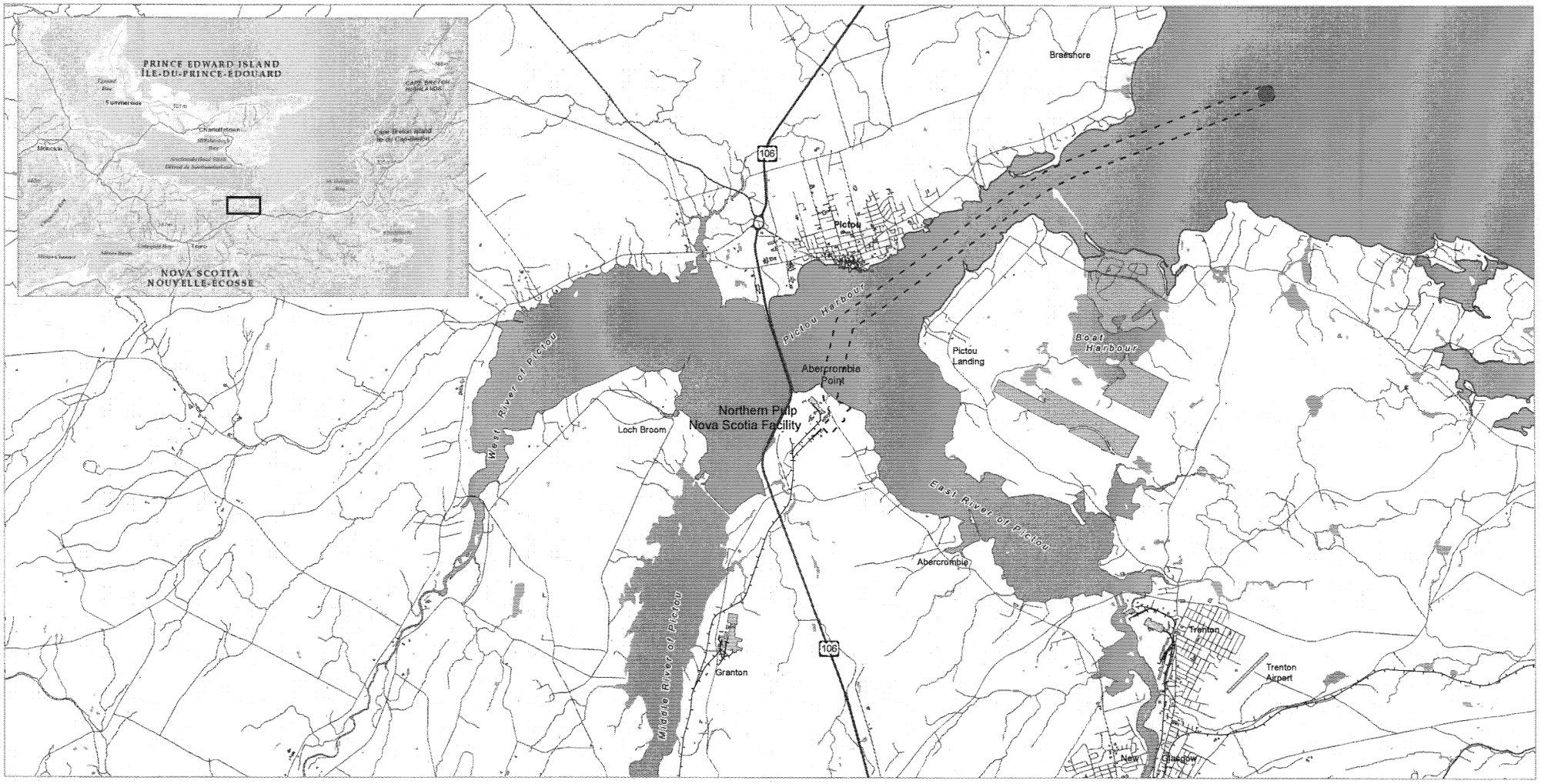
As is typical of NBSK pulping processes, NPNS produces wastewater ('effluent') as a by-product of its industrial process. NPNS' effluent is currently treated in the Boat Harbour Effluent Treatment Facility (ETF). Effluent from NPNS is currently piped under the East River to the Boat Harbour ETF, which is located near Pictou Landing First Nation.

In 1967 the pulp mill began operation under previous ownership. Paper Excellence purchased NPNS in 2011. The existing ETF at Boat Harbour is owned by the Province of Nova Scotia and has been operated by NPNS under lease since 1996. Prior to 1996, the facility was owned and operated by the Province of Nova Scotia. In 2015, the *Boat Harbour Act* was enacted requiring that the use of the Boat Harbour ETF cease by January 31, 2020.

In order for NPNS to remain operational, a replacement ETF is required to treat and dispose of the facility's effluent.

The design and construction of a new treatment facility and outfall location is a modification to NPNS's existing Industrial Approval and requires a Nova Scotia (provincial) Class EA process to predict and evaluate the environmental effects of the proposed undertaking. Nova Scotia Environment (NSE) has determined that the project will follow a Class 1 EA process.

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Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 1
Location Map

NORTHERN PULP
NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

Immediate Project Study Area
Approximate Outfall Location
Pictou Landing First Nation
Open Water
Roads
Watercourse
Railline

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY GeoNova, NRCan, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.5 1 2 km

PROJECT: 17-6461

Date: 2018-04-17

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2.1 Proponent and Design Team

The Project Proponent is Northern Pulp Nova Scotia (NPNS).

- NPNS has retained Dillon Consulting Limited (Dillon) to carry out the Nova Scotia provincial Environmental Assessment.
- KSH Solutions Inc., (KSH) out of Montreal, Quebec, is the engineering firm tasked with designing the replacement effluent treatment facility.
- Additional sub-consultant specialists are engaged on the project to provide specific expertise on project components such as lobster science, archaeology and air quality.

2.2 Project Location

The NPNS pulp mill is located at Abercrombie Point adjacent to Pictou Harbour in Pictou County, Nova Scotia (**Figure 1**). The NPNS mill is located approximately 3.4 kilometres (km) south of Pictou and 2.8 km northwest of Abercrombie; surrounding communities are identified on **Figure 1**. Abercrombie Point is bound by Pictou Harbour estuary to the north, Middle River to the west and East River to the east.

As shown on **Figure 1**, the Project Study Area includes:

- The footprint of the on-land effluent treatment facility. This is within NPNS property;
- A corridor identified by preliminary engineering studies within which the discharge pipe is expected to be located; and
- The outfall location, which includes a 100 m buffer around the proposed 6-port marine diffuser.

2.3 Document Outline

To facilitate ease of review this report is organized as follows:

- Section 3.0 provides context on the 50 year history of the pulp mill facility and the existing treatment facility, and describes the recommended replacement effluent treatment facility design;
- Section 4.0 outlines the project components;
- Section 5.0 details current federal involvement and jurisdiction, including proximity of the project to federal lands, and federal agency involvement and anticipated permitting;
- Section 6.0 describes the anticipated potential effects to fish and fish habitat, migratory birds, and Species At Risk;
- Section 7.0 describes the anticipated interaction of the project with the Mi'kmaq of Nova Scotia;
- Section 8.0 summarizes engagement activities undertaken to date, further engagement plans, what feedback and interest has been heard, and how this is being incorporated;
- Section 9.0 documents further provincial permitting anticipated following the EA process; and
- Section 10 is a closure to this submission.

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3.0 Background

3.1 History of the Plant

The plant was built in 1967 by Scott Paper Company. The plant has had several owners including Kimberly-Clark Corporation and Neenah Paper Company of Canada. Under its current name, Northern Pulp Nova Scotia Limited, the plant was held by Atlas Holdings and Blue Wolf Capital Management (2008), prior to its current ownership under Paper Excellence Canada Holdings Corporation (2011).

Since purchasing NPNS in 2011, Paper Excellence has injected over $200 million into the business for capital expenditures, loan principle repayments and interest payments, pension funding and to support operational and working capital needs. When Paper Excellence assumed ownership of NPNS it was known that environmental improvements were necessary. $70 million has been spent on environment projects since taking ownership of NPNS. Many of these projects and improvements have realized significant environmental improvements, including the following:

- Reduced odorous emissions by more than 90% on average;
- Reduced recovery boiler particulate emissions by 99% on average;
- Reduced mill wide particulate emissions by more than 80% on average;
- Reduced greenhouse gas emissions by replacing fossil fuels with natural gas;
- Reduced organics loading to the effluent so that BOD is now less than 20% of the Federal PPER; and
- Reduced solids loading to the effluent so that TSS is now less than 15% of the Federal PPER.

With over 330 dedicated employees, NPNS injects $315 million annually into the Nova Scotia economy. NPNS indirectly provides in excess of 2000 rural jobs as the province's largest supplier of sawlogs. NPNS is one of the provinces' largest land managers, overseeing 250,000 hectares of forested lands in Nova Scotia. Over the past 50 years of managing lands in Nova Scotia, NPNS has helped set aside over 60,000 hectares of high conservation value lands so they can be put into permanent protection.

3.2 History and Current Operations of the Boat Harbour ETF

As an incentive to attract industry to Pictou County, the Nova Scotia government envisioning a heavy industrial park in Abercrombie Point offered raw water supply and effluent treatment to potential incoming industries in 1965. Three companies were attracted to the County through these incentives. Scott Paper Company and Canso Chemicals took advantage of both the raw water supply and the effluent treatment. Michelin Tire, in part due to its greater distance from the Boat Harbour effluent treatment center, signed on for the raw water supply only.

Through this arrangement, Northern Pulp has used the Boat Harbour ETF to treat effluent from 1967 to present. Untreated effluent is piped from Abercrombie Point, along the bottom of the East River and across land to the Boat Harbour ETF. Many upgrades to the Boat Harbour ETF have occurred since its

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opening, and are described below. For the whole 50 year history, the Boat Harbour ETF has discharged into the Northumberland Strait at the outlet of the Boat Harbour estuary.

In 1967, no formal treatment process was associated with the Boat Harbour ETF as it was believed that nature and time were enough to treat the effluent from the industries using the facility. What is now operated as the Boat Harbour ETF is very different from its original state. Several major changes have occurred over the years improving treated effluent quality leaving the Boat Harbour facility. In 1972, the treatment process was significantly modified with the inclusion of settling ponds and an aeration basin. Canso Chemicals also used the Boat Harbour ETF from 1972 until the manufacturing operations concluded in 1992. Canso Chemicals was a chlor-alkali facility that generated sodium hydroxide from seawater using mercury as a catalyst.

Between 1992 and 1996 the federal government implemented new regulations under the *Fisheries Act* that called for significant improvements to effluent, specifically for the Pulp and Paper Industry. Multiple upgrades were made at the Boat Harbour ETF including: additional aeration, separation curtains in the aeration basin, and the addition of a nutrient feed system to optimize microbiological treatment activity. The effect of these upgrades, along with process improvements at NPNS itself, resulted in significantly improved effluent quality that met, and continues to meet, all applicable regulations.

In 1997 NPNS moved away from elemental chlorine to chlorine dioxide for bleaching to meet new federal Pulp and Paper Regulations for dioxins and furans.

The treatment facility was originally owned and operated by the province. In 1995, NPNS took over the operation of the treatment facility under a 10 year lease, which was later extended to 2030. Today, the facility is still owned by the province and is operated under lease agreement by Northern Pulp.
The Boat Harbour Effluent Treatment Facility that exists today operates within all federal and provincial regulations, including for dioxins and furans.

Following upgrades made over the life of the existing facility and considerable improvement in effluent quality, the 'regulatory point' where compliance to federal regulations is measured was changed. As of June 30, 2010 NPNS ceased using the portion of the ETF known as the Stabilization Basin (Boat Harbour Basin) as an active part of the treatment facility. The regulatory point was instead moved back to the outlet of the aeration stage.

3.3 *Boat Harbour Act*

In June 2014 there was a leak of untreated effluent due to a breach in the transmission pipeline from NPNS to the existing Boat Harbour ETF. The introduction of the *Boat Harbour Act*, which received Royal Assent on May 11, 2015, will prohibit the use of the provincially owned facility for the reception and treatment of effluent from the mill after January 31, 2020. It is the wish of Pictou Landing First

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Nation that Boat Harbour be returned to its original tidal state and made a place that the community can once again enjoy.

As a result of the *Boat Harbour Act*, NPNS is currently undertaking the design and Class 1 Nova Scotia EA of a new replacement ETF. The replacement ETF project will be located on NPNS property and direct effluent to the marine environment. In the siting of the marine discharge, the future tidal state of the Boat Harbour basin was assumed in the design. The ETF project is separate and distinct from the effort to remediate Boat Harbour, which is being led by the Province of Nova Scotia through Nova Scotia Lands.

3.4 Preliminary Engineering – Options Considered

Engineering design for the proposed ETF replacement and outfall route is ongoing. At the outset of the project, a list of viable alternatives for the ETF and outfall location was generated for evaluation. The evaluations for both the ETF replacement and the outfall route consider the environmental effects of the proposed undertaking, as required by the NSE Class EA process.

3.4.1 Effluent Treatment Facility Replacement Alternatives

The initial engineering process required a review of NPNS performance.

- Existing NPNS mill performance:
  - Historic mill effluent conditions;
  - Characterization of effluent streams;
  - Benchmarks for water use, organic loading and chlorinated organic discharges; and
  - Hydraulic loading.
- Compatibility with potential future NPNS mill performance improvements (anticipated future upgrades):
  - Oxygen delignification process; and
  - Cooling towers for fresh water reduction in summer.

Based on the understanding of facility design variables, several technologies and combinations were considered for effluent treatment, including:

- Aerated Stabilization Basins (ASB);
- Activated Sludge Treatment (AST);
- AST-like "high rate" systems:
  - Sequencing Batch Reactors;
  - Rotating Biological Contractors;
  - Biological Aerated Filters;
  - Moving Bed Bio-Reactors;
- Anaerobic Treatment; and
- Tertiary Treatment.

The processes were evaluated based on the following criteria:

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- Optimization – what process will reliably result in quality treatment, given the characteristics needing to be treated?
- Efficiency – does the technology match the requirement?
- Economic Viability – can the process allow for the continued viable operations of the plant?
- Flexibility – can the process function across various operating conditions?
- Footprint – can the process fit on NPNS property, without impacting adjacent natural features and property owners?

Advantages and drawbacks of each technology are included in **Table 1** below as outlined in the KSH Report of July 2017 entitled Preliminary Engineering for Effluent Treatment Facility Replacement – Technology Selection Summary (**Appendix A**).

Table 1: Effluent Treatment Technology Comparison

Process	Advantages	Drawbacks
AST	• Process flexibility • Large industry experience • Upgradability	• Potential sludge settle-ability issues • Potential foaming issues • Higher energy use for aeration
SBR	• Compact system • Very flexible for nutrient removal • Highly automated	• Not common at high (>40,000m3/day flows) • More complex design (electrical/mechanical) • Intermittent discharge
RBC	• Simple to operate • High process stability • Modularity • Low energy requirements	• High colour discharge • Limited degree of process automation • Mechanical concerns
BAF	• High loading rates • Small footprint • Modularity • Highly automated	• More complex design (electrical/mechanical) • Fine solids screening required • Potential for loss of media • Limited degree of process automation • Limited implementation
MBBR	• Simplicity of design • Small footprint	• Potential for loss of media • Limited degree of process automation • Limited technology choices for aeration
Anaerobic	• Low sludge generation • Small footprint • Biogas generation	• Required a high strength effluent to be applicable • Aerobic treatment required to address toxicity of treated effluent • Sensitive to process upsets
Tertiary	• Removes contaminants not affected by secondary treatment that are found to be harmful to the local ecosystem.	• Environmental footprint can sometimes be worse than the problem it addresses (power use, chemical additions, generation of sludges, etc.) • High operating costs • Sensitive to process upsets

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3.4.1.1 Closed Loop Review

In addition to the technologies discussed above, a closed loop system alternative was also considered. A closed loop (zero effluent) treatment alternative was immediately ruled out, however, as it is not an option for Northern Pulp. There are no mills anywhere in the world that produce elemental chlorine free (ECF) bleached kraft that operate a closed loop system.

NPNS produces NBSK pulp which is a different pulping process than mills that operate closed loop systems for BCTMP (Bleached Chemi-Thermo Mechanical Pulp) and Unbleached Kraft (UKP).

A closed loop system is not technically, nor economically, feasible because it would require NPNS to change the product that it manufactures. A global market study was undertaken by Brian McClay and Associates for NPNS, in order to respond to public and stakeholder interest, which confirmed that NPNS would not remain competitive and continue to be economically viable if it was not producing NBSK (**Appendix B**).

3.4.1.2 Treatment Technology Selection

Based on the outcome of the evaluation, the AST process was recommended for effluent treatment because it best meets the criteria considered in the evaluation.

3.4.2 Outfall Location

As a part of the preliminary engineering process, general locations for the outfall were evaluated. The evaluation was based on the following criteria:

- Models of effluent movement and behaviour;
- Cost;
- Constructability;
- Natural environment;
- Commercial, recreational and Aboriginal fisheries; and
- Other socio-economic sensitivities.

The final, exact location of the outfall will be determined as an outcome of the Environmental Assessment process, final engineering design and related regulatory approvals. To date, a proposed general location has been identified based on considering natural and socio-economic constraints as well as through scientific modeling of flow, dispersal and settling rates, and water chemistry. The recommended location of the outfall presented to date is based on a preliminary Receiving Water Study.

3.4.2.1 Receiving Water Study

A Receiving Water Study (RWS) was undertaken by Stantec Consulting Ltd. (2017, *Preliminary Receiving Water Study for Northern Pulp Effluent Treatment Plant Replacement, Pictou Harbour, Nova Scotia*; **Appendix C**) to:

- Evaluate potential locations for a marine outfall;

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- Recommend a preferred location;
- Evaluate and make recommendations for the design and performance of the diffuser at the end of the outfall; and
- Model how the treated effluent will mix with the water at the outfall in the Northumberland Strait.

As a part of the RWS the following potential discharge locations were evaluated:

- Alternative A, approximately 1 km from NPNS and Pictou Causeway outlet.
- Alternative B, located approximately 3 km from NPNS towards the centre of Pictou Harbour.
- Alternative C, located approximately 9.5 km from NPNS into the Northumberland Strait.
- Alternative D, located approximately 10 km from NPNS into the Northumberland Strait.

The specific objectives of the RWS were to: conduct far field hydrodynamic modelling to model regional and local effluent dispersion characteristics and provide recommendations on outfall location; to conduct near-field modelling to provide recommendations on the preferred outfall design; and to provide a preliminary description of construction methodology. Modelling considered worst case conditions of maximum daily effluent flow and conservative ambient conditions.

The results of the far field hydrodynamic modeling as shown in CORMIX model output video is included in **Appendix C-1 (USB Flash Drive)**. Also included are the modeling results of existing conditions. The far field hydrodynamic modeling does not model effluent quality directly. Instead, it uses a concentration of any arbitrary parameter set at 100 mg/L and assumes no biological decay for the purpose of identifying flow patterns in the receiving water. The far field modelling is run over a full tidal cycle to determine particle tracking within the watershed. It should also be noted that the existing conditions were modelled in the current state before Boat Harbour is opened to tidal in the future. Expected effluent quality is not inputted until the near field modeling stage to predict the effluent plume characteristics and design the diffuser. The videos clearly show the benefits of diffusing effluent prior to discharge in the Northumberland Strait.

The results of both the far field particle tracking and the near field effluent modeling resulted in a recommendation that the outfall be a six-port diffuser located at Alternative D. Of all the alternatives modelled, Alternative D provided the best dilution and mixing and thus the lowest potential for long-term cumulative effects on the fishery and social-economic environments. Alternative D also satisfied another key criterion during the selection of the preferred location of the outfall: the development of a solution that does not impact Boat Harbour in the future tidal state.

The predicted effluent quality meets applicable federal water quality guidelines for key water quality parameters and/or background condition (what is there now) within 100 m or less of the outfall. Due to port configuration (1.0 m above the seabed) and effluent buoyancy, the modelled plume does not interact to any appreciable extent with the seabed and therefore is not likely to result in potential

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adverse effect on the benthic environment. In addition, the effluent plume is predicted to not reach the surface until about 90 m from the diffuser, where the dilution ratio of the effluent is 102 times and water quality essentially meets background conditions. Read in conjunction with the understanding of the results from the most recent Environmental Effects Monitoring program (**Appendix D**), the RWS results indicate that minimal effects on the marine environment are expected.

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4.0 Project Components

The proposed replacement ETF will be located on NPNS property at Abercrombie Point. The proposed clarifiers and aeration basins associated with the ETF will be located to the east of the existing plant with a raw effluent spill basin constructed on the northeast side of the property. **Figure 2** shows a preliminary layout of the proposed replacement ETF, subject to final engineering design. Geotechnical investigations, for example, planned for completion this spring are required to further advance engineering design.

The proposed effluent outfall pipe associated with the replacement facility, is approximately 10 km long, and extends through Pictou Harbour with a discharge point into the Northumberland Strait.

Components of the undertaking include:

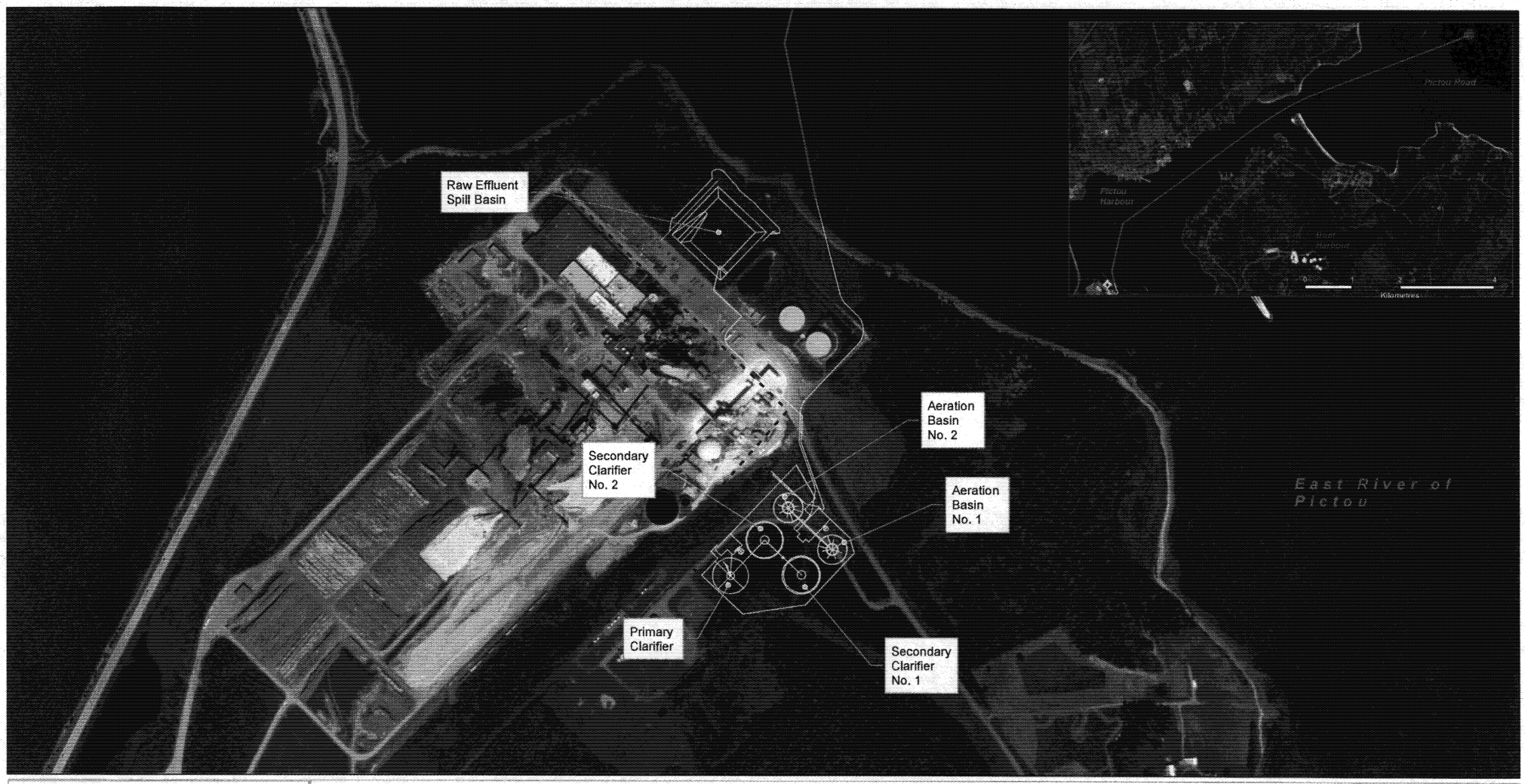
- Connection to existing facilities as noted below;
- Land-based components of the proposed treatment system; and
- Water-based components (pipeline and outfall).

The Environmental Assessment has been designed to assess a worst case scenario. **Section 4.2** discusses additional in-mill work which will, in the future, improve the overall environmental footprint of the NPNS plant but the construction of which are not part of the proposed undertaking. The design of the replacement treatment system and the Receiving Water Study (RWS) dispersion modeling were carried out without considering these improvements, and as such represented an exaggerated or worst-case scenario for the future.

Connection to Existing Facilities:

- Feed to ETF – an existing lift station will be used to pump the pre-screened effluent (pH adjusted via an existing control system adding either carbon dioxide or lime) to the new primary clarifier.

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Figure 2
Preliminary Project Layout

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Approximate Outfall Location
Preliminary Project Layout
Effluent Pipeline (Approximate Location)
Immediate Project Study Area

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY Northern Pup Nova Scotia, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.5 1 2 km

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Land-based components of the Replacement Treatment System:

The following components will be located on NPNS property to the south east of the existing plant site:

- Primary Clarifier – an above ground (open) circular (preliminary design 56 m diameter, 5.5 m depth) settling tank will receive the unclarified effluent and facilitate removal of primary sludge which will be pumped to a sludge storage tank. Primary clarified effluent will be pumped to a cooling system.
- Effluent Cooling – the cooling system proposed as part of the replacement ETF offers indirect contact cooling through a heat exchange system (preliminary design shell and tube type - 6 exchangers) with fresh water looped through an array of cooling towers. After cooling, effluent is gravity fed to the Activated Sludge Treatment Basins.
- AST Basins and Aeration- biological treatment occurs in two above ground circular open aeration basins (preliminary design at 28,000 m^3 for both treatment trains; 8.5 m depth) operating in tandem. Each AST basin will consist of an anoxic tank within an aeration tank. Before entering the biological treatment stage, four compounds are added to the effluent stream in various locations: sulphuric acid, nitrogen urea, phosphorus, and a defoamer (stored within enclosed building). Biologically treated effluent is then piped to two secondary clarifiers in parallel.
- Secondary Clarifiers - biological solids will be removed using two gravity clarifiers, which collect and recycle most of the biomass back to the inlet of the biological treatment system as Return Activated Sludge (RAS) to maintain treatment operations. Preliminary design is for 56 m diameter above ground (open) circular settling tanks with depth of 4 m. Waste Activated Sludge (WAS) is pumped to the sludge treatment system. Treated effluent is pumped to the effluent pipe and marine outfall.
- Sludge Management – sludge from the primary clarifier and residual sludge from the secondary clarifiers (after recycling though the system) is pumped to a sludge process building. Dewatering of the sludge results in a filtrate which is recycled in the AST basins to be retreated, and the thickened solids portion which is proposed to be directed to the existing biomass power boiler.
- Treatment Building – as noted above, ancillary facilities (e.g., pumps, heat exchanger, aerators, sludge management) will be within an enclosed building at the treatment system.

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Additional land-based components on NPNS property:

- Spill Basin - For contingency, in the event of process upsets, spills or other unusual events, the effluent will be diverted to a new spill basin, which has a proposed capacity of 25,000 m^3. The spill basin will be a High Density Polyethylene (HDPE)-lined, earthen basin with 8 hour retention time, and the capability of returning contents to the ETF system at the initial feed location.
- Effluent Pipeline - The proposed effluent pipeline will be a 900 mm diameter (preliminary sizing) HDPE pipe. HDPE was selected for its flexibility to reduce the need for mechanical bending of the pipe over the length of the outfall. The pipeline begins on land at a sump chest where treated effluent from the secondary clarifiers is pumped into the pipeline. Pumping is required to overcome static pressure exerted on the submarine pipeline to achieve proper dispersion of the effluent. The land based portion of the pipeline will be approximately 575 m and buried within a trench.

Water-based Components (Provincial or Federal Waters):

- Effluent Pipeline –In water the effluent pipe will extend to the diffuser. It is anticipated based on preliminary design that the first 1000 m of the marine portion of the pipeline will be placed in a trench 1.5 m deep with armourstone protection covering the pipe and trench over a distance of 500 m. Once the pipe exits the trench, it will most likely lay on a rock mattress to smooth out the uneven profile of the harbour bottom. Armourstone protection will be provided in some or all areas as required by the design. The last 200 m of the pipeline will be lain in a trench and armourstone protection will enclose the last 150 m and the diffuser. The entire outfall pipeline length from sump to diffuser will be approximately 10.5 km.
- Diffuser- The diffuser proposed for the project will be a six port design and constructed of HDPE. Each of the six ports on the diffuser will be on a 1.0 m riser pipe with an elastomeric duckbill opening. The duckbill opening will prevent intrusion of sea water, sediment, and other materials into the diffuser which would reduce the hydraulic capacity and dilution efficiency of the system (Measureit.com. 2018). Armourstone protection would be extended to the riser pipes.

4.1 Project Activities

Project activities will occur through construction, operation and ultimate decommissioning of the effluent treatment facility. Decommissioning will be undertaken based on environmentally acceptable practices and regulatory requirements at the time and is not discussed further here.

4.1.1 Operation and Maintenance

Based on preliminary design the proposed ETF will undertake effluent treatment using an AST technology. The treatment plant will process about 62,000 m^3/day of effluent on an annual average (85,000 m^3/day peak daily maximum flow).

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A portion of effluent is created through the kraft pulp mill process. Effluent also includes a high percentage of non-contact cooling water in addition to kraft pulp effluent. Future planned projects at the NPNS mill to reduce the effluent volume, though not included in the EA, include the addition of cooling towers to reduce their fresh water consumption (see **Section 4.2**).

Raw water used by the NPNS plant is provided via a provincially-owned water intake facility in the Middle River, in Granton. R. V. Anderson Associates Limited (2015, **Appendix E**) completed a review of the surface water availability and sustainable water consumption rate for the Middle River at Granton that took into account future climate change. The report concluded that a sustainable water withdrawal rate of 95,040m^3/day will not impact the ecosystem. The Middle River discharges to the tidal estuary upstream of the Pictou Causeway eventually leading to the Northumberland Strait.

As summarized in **Section 3.4.2.1**, a preliminary receiving water study has been completed (Stantec 2017), where near-field modelling was performed to determine the acceptability of expected daily maximum effluent water quality for a number of parameters on the receiving environment. The maximum effluent flow rate of 85,000 m^3/day was used for the analysis. The highest flow rate represents the most challenging conditions for plume dispersion and is therefore considered to be worst case. Flows lower than the maximum daily effluent flow will result in improved mixing. **Table 2** outlines both daily maximum effluent quality and monthly average effluent quality results. Daily Maximum effluent quality was used for the near field modeling, again representing worst case conditions for the 30 day tidal cycle models.

Table 2: Daily Maximum Effluent Water Quality (from Stantec 2017)

Parameter	Unit	Daily Maximum	Monthly Average
Adsorbable Organic Halides (AOX)	milligrams per litre (mg/L)	7.8	3.9
Total Nitrogen (TN)	mg/L	3.0	3.0
Total Phosphorus (TP)	mg/L	1.5	1.5
Colour	True Colour Unit (TCU)	750	750
Chemical Oxygen Demand (COD)	mg/L	725	480
Biochemical Oxygen Demand (BOD_5)	mg/L	48	24
Total Suspended Solids (TSS)	mg/L	48	24
Dissolved Oxygen (DO)	mg/L	>1.5	>1.5
pH	units	7.0 to 8.5	7.0 to 8.5
Temperature	Degrees Celsius (°C)	25 (winter), 37 (summer)	25 (winter), 37 (summer)

Maintenance activities will be undertaken as required and are expected to include routine equipment inspections. Routine inspections of clarifiers and aeration stages are typically performed while the equipment is full. In the unusual event that one of the clarifiers or aeration stages must be emptied for

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inspection or repair, plans will be developed to gain access without a release of untreated effluent to the environment. The two spill containments will be used to hold effluent in the event of a power failure and are sized to allow for an orderly shutdown of the mill. The use of chemicals, outside of the normal process chemicals, for activities such as cleaning or flushing are not anticipated. The generation of hazardous wastes requiring treatment or disposal are not anticipated.

4.1.2 Construction

Construction will include both land-based and water-based components. Construction methodologies are currently being confirmed. It is anticipated that preconstruction activities will include construction planning, Environmental Protection Plan development, permitting and activities related to finalization of design, such as survey work and additional geotechnical work if required.

On land construction will consist of typical clearing, excavation and earth works to install the below ground portion of the treatment system and building foundations. It is anticipated that the land-based facility will be built over two construction seasons (clearing will be completed outside the bird nesting season).

Construction of the effluent pipe will require trenching of on-land portions. Armourstone protection will be installed on the shore zone portion. Alternatives for the in-water pipe construction will depend on final design. It is anticipated that some of the pipe/diffuser will be laid on a rock mattress; however some removal of the ocean bed may be required. Options for in-bed portions of the pipe include; dredging, trenching or Horizontal Directional Drill (HDD). A temporary rock causeway may be required in the nearshore. Pipe installation is expected to involve on-land fabrication of sections (1000 m length) with bolted flanged connections and expansion joints, and precast concrete collars. Fabrication and laydown areas are anticipated to be located within NPNS property. Pipe sections would be floated and barged to final location and filled with water to lay in place for subsequent armourstone protection installation where required. Installation of the rock mattress, pipe and diffuser and armourstone is expected to be completed using barges and tugs. Rock will be sourced from existing approved facilities.

In-water construction is anticipated to occur after land based construction and will be scheduled to mitigate impacts to other water users and sensitive environmental features. Timing of the in-water construction will not be known until the final engineering design is completed. Construction is anticipated to occur in one construction season. NPNS will work with regulatory authorities to adhere to avoidance of significant environmental effects in relation to timing windows as identified during the EA process.

Work will be conducted complying with required federal, provincial and municipal permits/approvals and guidance as noted during the EA and subsequent approval processes.

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4.1.3 Emissions, discharges and waste

Dewatered solids ('sludge') is collected as a waste material from the ETF. The sludge includes clay, sand, silt, organic matter, nutrients, microorganisms and metals. It is proposed that the sludge is mixed with the existing biomass feeding the NPNS Biomass Power Boiler. Combustion will occur as it does now, which is on a travelling grate at the bottom of the boiler, using the same controls and combustion temperatures as are currently being used. Quantity of sludge generated will be determined after detailed engineering is complete, but will be approximately 5 - 10% of the biomass currently fed to the boiler.

With the proposed future addition of sludge into the power boiler, potential for changes to air quality are being assessed using air dispersion modelling as part of the Environmental Assessment. Effluent quality is discussed under operation of the ETF in **Section 4.1.1** above.

The replacement ETF will significantly reduce odour emissions relative to existing conditions. Core to the treatment difference between the existing and proposed facility is how accumulated solids are handled. In the new system they will be continuously removed as underflow from the clarifiers. In the existing facility, solids settle over time in both the primary sedimentation basins and the aerated stabilization basin and decompose under anaerobic conditions, generating hydrogen sulfide, hence creating odour. Additionally, air needed in the process will be injected subsurface in the new facility. In the existing facility, aeration stages occur at the surface, by the action of the surface aerators that throw the effluent into the air to allow it to absorb oxygen. This action also allows sulphur compounds to be released to the atmosphere by volatilization. The new cooling stage was also designed with odour in mind. NPNS has opted to install indirect effluent cooling to completely eliminate any chance for odour release from this stage in the process.

4.2 Proposed in-Plant Upgrades

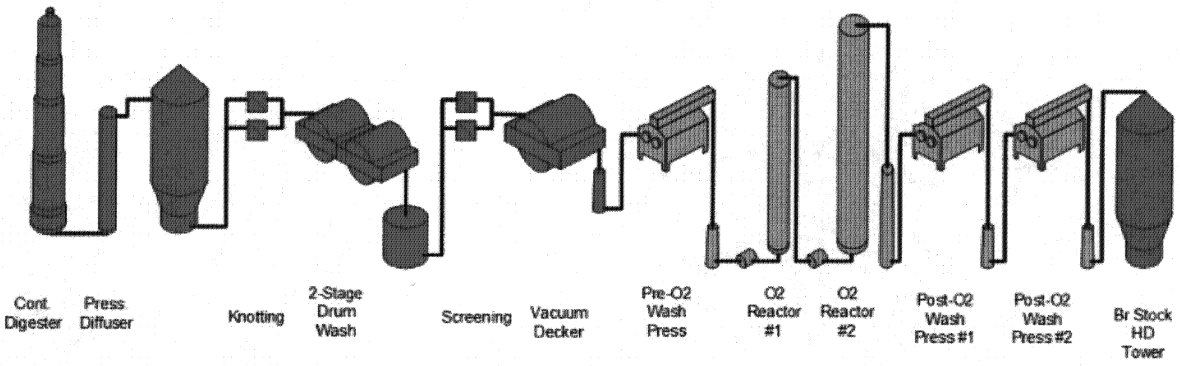
There are several in-plant upgrades proposed subsequent to the ETF project which are anticipated to further improve effluent quality, including the addition of an oxygen delignification system and fresh-water cooling towers. The environmental improvements resulting from the proposed upgrades described are not included as part of the EA. The proposed in plant upgrades will occur subsequent to the commissioning of the Effluent Treatment Facility, and therefore, the ETF must be able to meet approvals for construction without the upgrades in place.

4.2.1 Oxygen Delignification System

Two stage oxygen delignification technology will be incorporated into the pulp making process. The system includes oxygen reactors and wash presses. It will be installed after the brown stock washing stage and before the existing bleaching stages. A process flow diagram is included in **Figure 3** below.

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Figure 3: Process Flow Diagram for Future Oxygen Delignification System



Legend:
Existing equipment: Yellow
Future equipment: Pink

Oxygen delignification systems use oxygen gas to react with residual lignin that remains in the pulp after brown stock washing. The lignin removed in this new stage will result in the use of less bleaching chemicals to whiten the pulp in the existing bleach plant. It is a significant and well-proven process for Elemental-Chlorine-Free (ECF) pulp and as such it is often referred to as the first stage of bleaching (oxygen bleaching). Benefits of oxygen delignification include:

- Reduces chlorine dioxide bleaching chemicals by 30-40% leading to a decrease in effluent loading for BOD, COD and AOX;
- Improvement in aesthetics of effluent (colour);
- A reduction in wood losses;
- Increase in recovery of lignin that can be used in the boiler thus reducing carbon footprint; and
- A reduction in nutrients added to the effluent.

4.2.2 Water Cooling Towers

A significant portion of water consumption at the NPNS facility is using non-contact water systems for cooling and maintaining temperatures within the kraft pulp system. NPNS will install water cooling towers (subsequent to the ETF Project) to decrease the temperature of water used in the cooling systems. This will allow for water to be recycled within the system, as well as making the cooling itself more efficient. Water used in the cooling system, once too warm to be recycled, is fed into the effluent treatment facility. By making the cooling system more efficient, less volume of water in total will be used and ultimately less water will be transferred to the effluent treatment facility. The current cooling systems are once-through services with no segregation from the main effluent stream.

The water reduction as a result of the anticipated future cooling towers will be considered under the cumulative effects assessment in the EA.

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5.0 Federal Involvement: Financial Support, Lands and Legislative Requirements

5.1 Financial Support

At the date of submission, no funding or financial support is being received from the Government of Canada to complete the Project.

5.2 Federal Lands and Jurisdiction

As shown on **Figure 4** the two water parcels come under federal jurisdiction: one in Pictou Harbour (administered by the Ports Program of Transport Canada), and the other under the federal jurisdiction (assumed coastal waters) at the outlet of Pictou Harbour into the Northumberland Strait. NPNS will be required to apply for applicable waterlot leases/licences in order to construct and operate the proposed replacement effluent pipeline and outfall. As part of the application, Transport Canada will consider the likelihood of potential environmental effects of the project as required under CEAA 2012.

The environmental effects of the project within federal jurisdiction are being considered as a part of the NSE Class EA process including to:

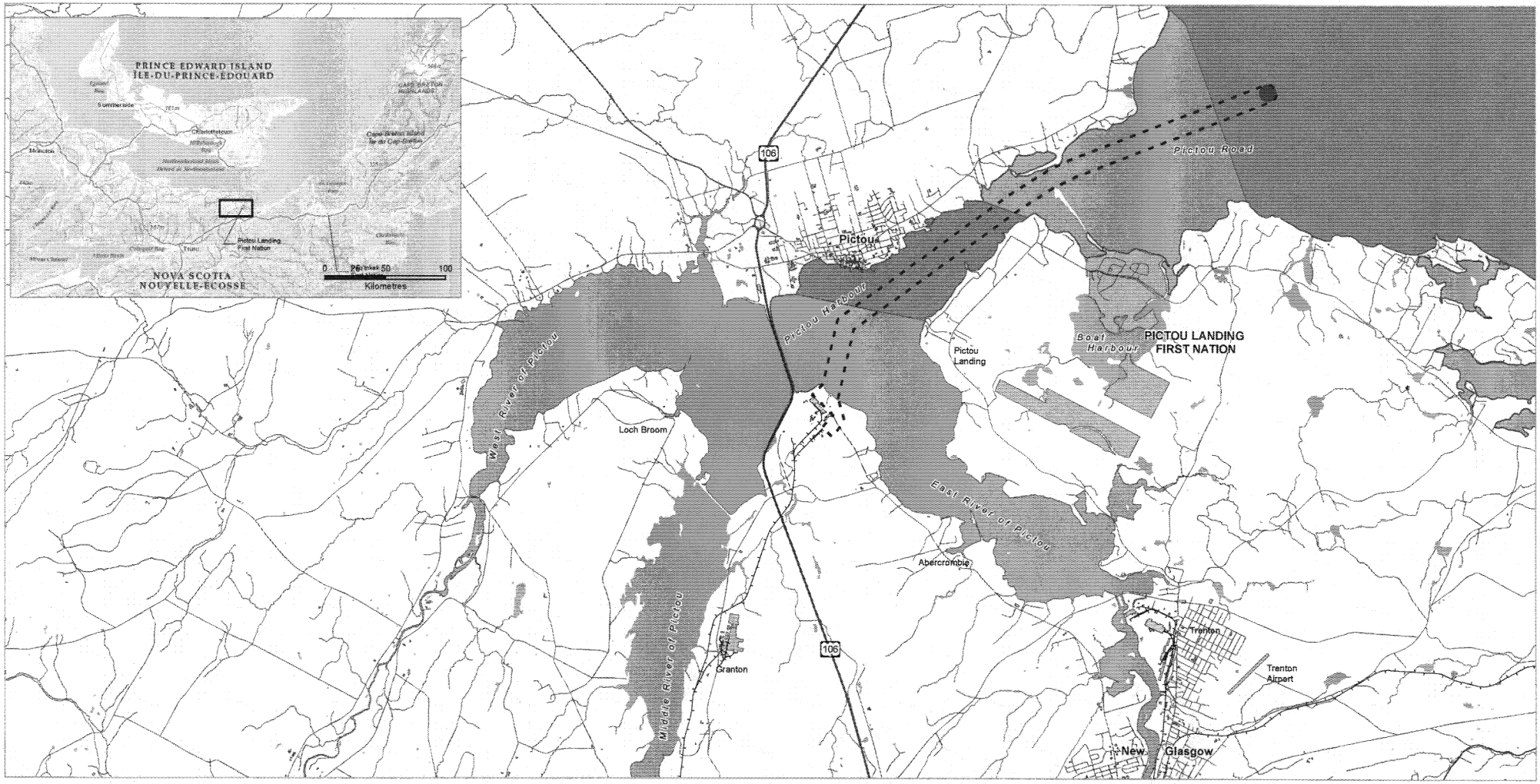
- Fish and fish habitat;
- Migratory birds;
- Species at Risk;
- Federal lands (as noted above); and
- Indigenous peoples.

It is noted that the provincial EA process also addresses similar elements to CEAA 2012, with additional valued ecosystem components that will be studied in the Class 1 EA including:

- Atmospheric conditions;
- Ambient noise levels;
- Surface water quality;
- Groundwater quality and quantity;
- Existing and planned land use;
- Socio economic environment:
    - Employment and local economy;
    - Fisheries (including aquaculture and marine harvest) and navigation;
    - Recreation and Tourism; and
- Historical, Archaeological and Paleontological Resources.

Cumulative effects will be investigated and recommended follow-up and monitoring studies will also form part of the provincial Class 1 submission.

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Figure 4
Federal Lands

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- Immediate Project Study Area
- Approximate Outfall Location
- First Nation Reserve Lands
- Waters and Submerged Lands Under Federal Jurisdiction
- Open Water
- Roads
- Watercourse
- Railline

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY GeoNova, NRCan, DFO, ESRI

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.5 1 2 km

PROJECT 17-0461 Date: 2018-04-17

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If interactions are determined environmentally acceptable, subsequent approvals and permitting processes will be undertaken by municipal, provincial and federal regulatory authorities.

5.2.1 Potential Federal Requirements

Federal regulatory processes that may be required for the proposed Project include review and potential authorization/approvals under the *Fisheries Act* and the *Navigation Protection Act,* and potentially, if dredging occurs, for a Disposal At Sea (DAS) permit under the *Canadian Environmental Protection Act.* In addition, effluent quality requirements are set under the *Fisheries Act* Pulp and Paper Effluent Regulations (PPER), other pulp and paper regulations. Health Canada has also requested a review of potential effects.

5.2.1.1 Fisheries and Oceans Canada (DFO) Serious Harm Process

The proposed effluent pipeline and diffuser/outfall are located within the marine environment. Potential for fish habitat within the footprint of the proposed pipeline/outfall will be assessed as part of the provincial environmental assessment using side scan sonar and video. The proposed habitat assessment plan (Marine Benthic Habitat Study) has been reviewed by Fisheries and Oceans Canada (DFO, Ecosystems Management). In addition, geotechnical investigations are planned for this spring in order to facilitate detailed design and provide sufficient information to estimate the harbour/marine footprint of the pipeline/outfall. Habitat assessment and preliminary proposed project footprint information will form a component of a DFO Request for Review to determine authorization requirements under the federal *Fisheries Act*. The provincial EA will identify predicted potential impacts to fish habitat in relation to the proposed project and, if fish habitat loss is predicted, will outline offset requirements. The application process for a Serious Harm authorization will be prepared if determined to be required by DFO.

5.2.1.2 Transport Canada Navigation Protection Program Process

In addition to the waterlot lease/licence requirement noted above, input from Transport Canada (TC) regarding navigation requirements has been initiated and will continue through the design process. Pipeline and outfall design (including construction) will reflect TC requirements and it is anticipated, based on preliminary discussions with TC, substantial interference with navigation will not occur. It is noted that the project is occurring within Pictou Harbour, and the Atlantic Ocean, both identified on List of Scheduled Waters under the *Navigation Protection Act.* Detailed engineering design will be provided to TC for review and will be completed such that it meets TC Navigation Protection Program requirements. Reflective of the final pipeline routing and guidance from TC, a 'Notice to the Minister' application for works including construction, and final placement of the pipeline and outfall will be made if required.

5.2.1.3 Disposal At Sea (DAS)

Detail design has not been completed for the construction of the marine outfall and pipeline. Underwater geotechnical investigations and underwater habitat surveys currently underway will inform pipeline routing and construction methodology. Dredging sections of the pipeline route are not

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anticipated based on existing bathymetry, however, it remains a potential approach if required to address localized subsurface conditions. If ocean based disposal of dredge material is appropriate and environmentally acceptable, a Disposal At Sea (DAS) permit application will be made. Alternative disposal options would be identified as a contingency to this approach as part of the provincial EA completion.

5.2.1.4 Pulp and Paper Effluent Regulations (PPER)

A preliminary Receiving Water Study was completed by Stantec Consulting Ltd. on August 11, 2017 (see **Section 3.4.2.1**). In the study, water quality guidelines were assessed based on the approach identified by the Canadian Council of Ministers of Environment framework (CCME 2003 – Guidance on the Site-Specific Application of Water Quality Guidelines in Canada) and the Atlantic Canada Wastewater Guidelines Manual (ECCC 2006). The effluent is anticipated to meet compliance with federal Pulp and Paper Effluent Regulations (PPER), and with key established water quality guidelines and/or will meet ambient water quality (current background) at the edge of a standard mixing zone (CCME 2009 - Canada-wide Strategy for the Management of Municipal Wastewater Effluent).

Pulp and Paper Effluent Regulations (PPER) were developed to manage threats to fish, fish habitat and human health (related to fish consumption) from pulp and paper mill deposits into water frequented by fish. The PPER, and those regulations cited by the PPER, regulate the quality of effluent and sit under the jurisdiction of ECCC. Continued compliance with PPER was a requirement of project design and a significant consideration in the design of future monitoring programs.

5.2.1.5 Human Health: Health Canada Review

Health Canada has provided input to the project team regarding the assessment of potential human health impacts, with a particular focus to the Pictou Landing First Nation. NSE (Environmental Assessment Branch) has requested that Health Canada be engaged on the provincial EA of the project, and has indicated that Health Canada's input will be sought by NSE during the provincial EA review process.

The human health review for this project will focus on potential exposure and risks that may be incurred from harvesting and consumption of marine food items that could be affected or influenced by the effluent. Potential for additional exposure pathways from other project elements will also be reviewed and assessed. For example, completion of detailed design and modeling of air emissions will confirm if air is an exposure pathway that requires assessment.

Based on the background information available on the existing facility and other comparable facilities around the world, a Human Health Risk Assessment is not anticipated to be completed as part of the EA Registration document. The scope of the impact assessment for human health is being developed with input received in order to address Health Canada interests at the provincial EA stage and continued discussions will be held to determine commitments required beyond the EA.

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6.0 Potential Effects: Fish and Fish Habitat, Migratory Birds, and Species at Risk

The following provides a brief summary regarding the potential effects to fish and fish habitat, migratory birds and species at risk based on the current preliminary understanding of project activities and footprint. Additional clarification of project design, footprint and construction methodologies will be based on additional design, geotechnical and underwater benthic habitat study to occur this spring and if significant changes or environmental features are identified, mitigation will be developed to address environmental implications on consultation with appropriate regulatory authorities.

Potential effects may occur as a result of accidental releases of petroleum, oil or lubricants (POL) during construction or operational activities and would apply to the components below. Standard POL handling mitigation procedures will be included in Environmental Protection Planning (EPP) for construction activities, and contingency and emergency response plans will be in place.

6.1 Fish and Fish Habitat

As a component of the provincial Class 1 EA process, the environmental effects of the project on fish and fish habitat are being addressed. Habitat assessment is proceeding under DFO's assessment process as noted in **Section 5.2.1.1**.

A background review of commercial, recreational and Aboriginal fisheries in the vicinity of the proposed project and identification of potential fish species and their life stages present within the harbour/marine study area is being undertaken. The review of fisheries information includes available mapping, as well as available information regarding species presence from PLFN, commercial fishermen, and local residents. Background information (in addition to the Stantec 2017 Preliminary Receiving Water Study (**Appendix C** and EEM document in **Appendix D**) reviewed included:

- Jacques Whitford Environment Limited. 2001. Atlas of Ecologically and Commercially Important Areas in the Southern Gulf of St. Lawrence. Environmental Studies Research Funds report ESRF 140, Calgary. 76 p.
- Fisheries and Oceans Canada. (17 November, 2017). Marine Conservation Targets Map. Retrieved from: http://www.dfo-mpo.gc.ca/oceans/maps-cartes/conservation-eng.html on 14 March, 2018.
- Ocean Biogeographic Information System (OBIS) retrieved from http://iobis.org/ on 11 Sept. 2017.

Figure 5 Illustrates information on fisheries received to date.

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Figure 5
Fisheries Activity from Public Information Session

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Shellfish
Lobster, Marine Mammals, Sharks, Rock Crab,Tuna
Smelt
Eel
Salmon
Herring
Scallop
Immediate Project Study Area
Approximate Outfall Location
Wetland
Open Water
Watercourse
Roads
Railline

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY GeoNova, Public Consultation

MAP CREATED BY: SCM
MAP CHECKED BY: AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.5 1 2 km

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PROJECT: 17-6461

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The proposed project design will reflect mitigation to minimize conflicts with fishing activity or sensitive migratory periods identified. DFO is being consulted throughout the EA process. Additionally, the proponent has hired a lobster researcher, one of several experts recommended by commercial fishermen, to review the potential impacts of the effluent on lobster and lobster larvae to assess the potential of the project to adversely affect the Northumberland lobster fishery.

Pictou Harbour supports several commercial, recreational and indigenous fisheries. The East River, which is to the east of the plant and the location of the proposed discharge pipeline, is a fishing ground for American eel (*Anguilla rostrata*), smelt (*Osmerus mordax*) and gaspereau (*Alosa pseudoharengus*) and, in the past (currently closed) blue mussel (*Mytilus edulis*) and soft shell clam (*Mya arenaria*). Recreational fishing of Atlantic salmon (*Salmo salar*), striped bass (*Morone saxatilis*), brown trout (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*) may occur within the East River as well. Pictou Harbour is located to the north of NPNS and exits into the Northumberland Strait. Fisheries within Pictou Harbour include American eel, smelt, gaspereau and lobster (*Homarus americanus*), as well as recreational mackerel (*Scomber scombrus*). The waters of the Northumberland Strait in the vicinity of Pictou Road (local name for the coastal area) are common fishing grounds for herring (*Clupea harengus*), mackerel, lobster, rock crab (*Cancer irroratus*), sea scallop (*Placopecten magellanicus*), Atlantic cod (*Gadus morhua*), American plaice (*Hippoglossoides platessoides*), hake (*Urophycis tenuis*), winter flounder (*Pseudopleuronectes americanus*) and gaspereau (Stantec, 2017 and Jacques Whitford Environment Limited 2001). A scallop buffer zone (DFO management measure) encompasses Pictou Harbour and East River that prevents scallop dredging to protect juvenile lobster habitat (DFO, 2017). The nearest mapped provincial aquaculture site (American oyster, bay quahog) is located 4.8 km from the proposed outfall.

6.1.1 Potential Effects and Mitigation in Relation to Fish and Fish Habitat

Potential effects to fish and fish habitat can result indirectly from land-based activities and both indirectly and directly from water-based activities. Potential effects related to land-based project activities including site clearing, excavation and construction are most likely related to sediment generation. Well established mitigation measures are available to address potential sediment related effects and are incorporated into project design.

Water-based construction activities which may have potential indirect effects to fish and fish habitat include placement of material in water, use of equipment, and potential for dredging activities (potential suspended sediment or contaminant release). Standard mitigation measures have the capability to address these potential effects. It is noted that any dredging would require sediment analysis and appropriate management.

The footprint of the proposed pipeline has the potential to directly impact fish habitat. The nature of the benthic fish habitat is to be confirmed based on the underwater benthic habitat survey, however it is acknowledged that a large portion of the harbour bottom consists of silty sand sediments and limited potential for aquatic diversity. The most likely benthic species present (as identified in historical data

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including Environmental Effects Monitoring – see **Appendix D**) are infauna such as marine worms and shellfish. Portions of the project footprint, particularly within the nearshore and the narrows near Lighthouse Beach, have potential for more diverse habitat, benthos and marine plants. The results of the habitat study will be used to identify the available benthic habitat, design appropriate mitigation for construction and operations and help predict the potential for marine fauna and fisheries species to be effected, both positively and negatively, by this project. It is recognized that offsetting plans may be required. As discussed above, direct habitat loss will be addressed within DFO's authorization process.

Public concern has been raised regarding the quality of the treated effluent in relation to effects to marine environment within the Northumberland Strait. Hydrodynamic and water quality modeling has been completed as part of the Receiving Water Study (Stantec, 2017). Meeting federal regulations for the outfall under the PPER was taken as base criteria to meet in the design and siting of the facility. The Preliminary Receiving Water Study further assessed water quality guideline targets based on the approach identified by the Canadian Council of Ministers of Environment framework (CCME 2003 – Guidance on the Site-Specific Application of Water Quality Guidelines in Canada). The effluent is anticipated to meet the federal PPER for established water quality guidelines and ambient water quality at the edge of a standard mixing zone (CCME 2009 - Canada-wide Strategy for the Management of Municipal Wastewater Effluent).

The EA will address the potential for impacts to fish and fish habitat as a result of treated effluent discharge. A monitoring program will be developed in compliance with the PPER and additional follow-up monitoring identified, if determined to be required based on regulatory input.

Timing and design of each phase of the project will be planned to minimize the impact of construction and operation on active commercial, recreational and aboriginal fisheries in the project area, as well as on known fish spawning and migration times.

6.2 Migratory Birds

The provincial Class EA will initially identify potential migratory birds and habitats within the study area. Field surveys, conducted by an experienced birder, are underway and will include breeding bird assessments and identification of bird use of the project area. Avian habitats and seasonal movements throughout the terrestrial and estuarine/marine environments of the project area will be identified based on a review of the existing data and field investigations. The EA will assess environmental effects and potential impacts to migratory birds as a result of construction and operation of the project.

Several potential areas for migratory bird habitat exist in the immediate vicinity of the proposed project area (see **Figure 6** -Birds and Shoreline Sensitivities from Figure 2-11 Stantec's Preliminary Receiving Water Study – Pictou Harbour Nova Scotia, August 2017). The waters of the East River provide general habitat for migratory coastal/shoreline birds. Known winter migratory bird habitat exists to the northwest of NPNS along the Hwy. 106 causeway. Potential migratory bird habitat exists along the

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shorelines of Pictou Harbour (Stantec, 2017 and DFO, 2017). Species at Risk birds are discussed in **Section 6.3**.

It is noted that the provincial EA will also address birds not covered under the *Migratory Birds Convention Act*, which are known to occur in the general area including Bald Eagle nests (identified as other habitat by the Nova Scotia Department of Natural Resources and shown on **Figure 7**) and a cormorant colony (and associated provincial protection). The provincial Wildlife Management Area (as indicated on **Figure 7**) is predominately private lands that include a nature trail and Double-crested Cormorant colony on the Pictou Highway 106 Causeway. Provincial regulations prohibit hunting and trapping in this area.

6.2.1 Potential Effects and Mitigation in Relation to Migratory Birds

Potential effects to migratory birds could occur as a result of clearing activities (direct loss of nests) or disturbance during construction (such as indirect disturbance of nesting). The EA will provide recommendations to mitigate potential adverse effects to migratory birds. A key mitigation will be to avoid sensitive nesting windows during clearing and pipeline/outfall construction activities.

6.3 Species at Risk

The effects of the project on species at risk are considered as a part of the provincial Class EA. Potential terrestrial, aquatic and marine species at risk have been initially identified through the Atlantic Canada Conservation Data Center (ACCDC) database, DFO data sources, the Species at Risk Public Registry, and the Nova Scotia Significant Habitats Database (maintained by the NSDNR) which includes species at risk habitats (see **Figure 7**). Follow-up field investigations are based on findings.

Formal protection for Species at Risk is provided under Species at Risk legislation including:

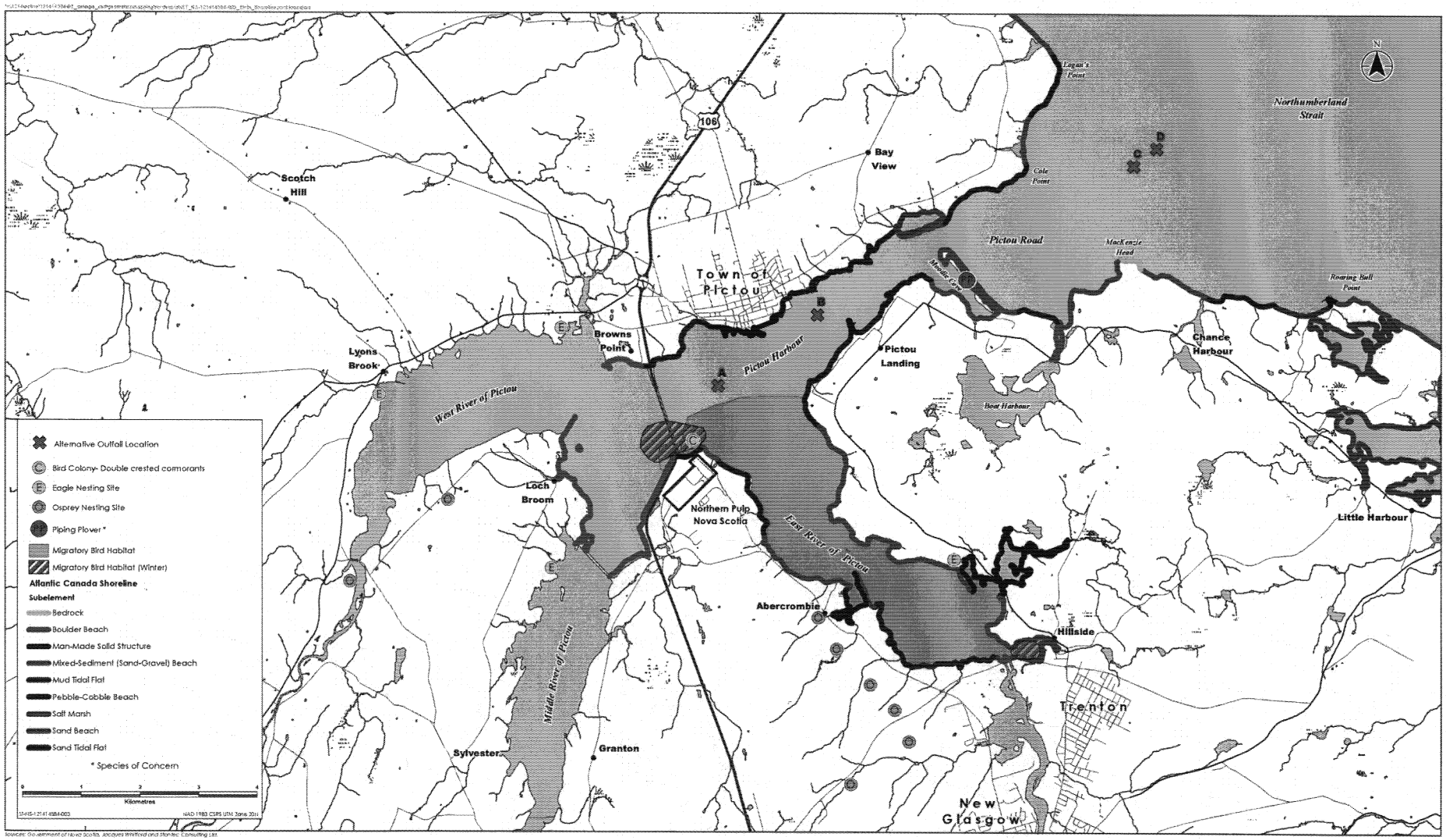
- *Species at Risk Act* Schedule 1; and
- *Nova Scotia Endangered Species Act* (NSESA)

Additional consideration within the provincial EA include assessment of species under the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and provincial wildlife status of species (at risk and may be at risk provincial species that are not yet listed under Species at Risk legislation). There is no identified federal Critical Habitat within the project study area.

Terrestrial Species

The ACCDC provided a list of priority species (i.e., plants and animals) within a 5 km buffer zone (standard ACCDC procedure) of the site of the proposed work. On review of the SARA/COSEWIC species listed as endangered and threatened or of special concern, ten species are identified as having potential in the general area in **Table 3** below.

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Source: Government of Nova Scotia, Jacques Whitford and Stantec Consulting Ltd.

Disclaimer: This map is for illustrative purposes to support this Stantec project; questions can be directed to the sourcing agency.

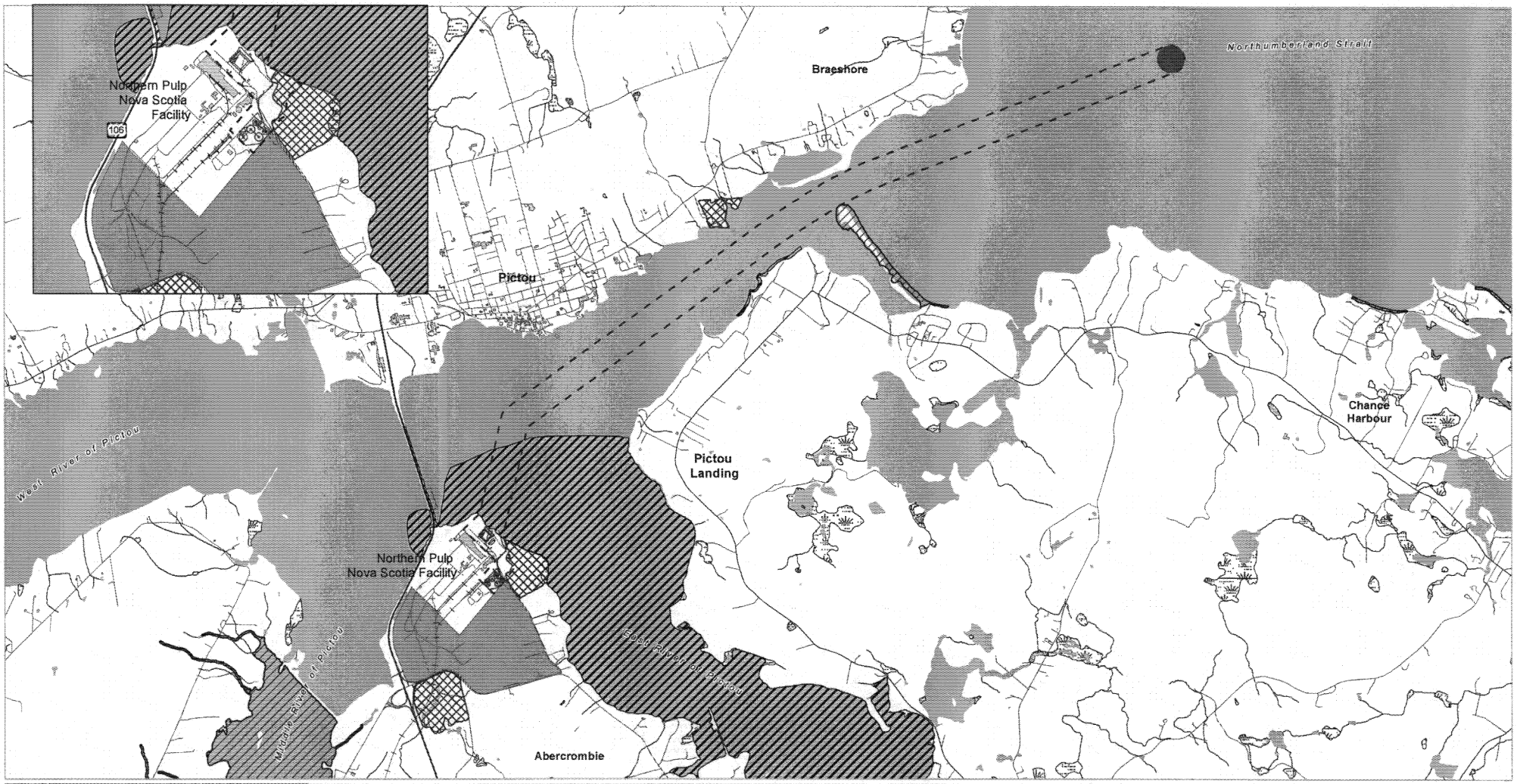
Bird and Shoreline Sensitivities

Stantec

PRELIMINARY RECEIVING WATER STUDY – PICTOU HARBOUR, NOVA SCOTIA

Figure 2-11

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Northern Pulp Nova Scotia Corporation
Replacement Effluent Treatment Facility
Environmental Assessment

Figure 7
Nova Scotia Department of Natural Resources Identified Areas

NORTHERN PULP
NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY

- Immediate Project Study Area
- Preliminary Project Layout (Land Components)
- Approximate Outfall Location
- Abercrombie Provincial Wildlife Management Area
- Road
- Watercourse
- Wetland
- Open Water

NSDNR Significant Wildlife Habitats
- Migratory Bird Habitat
- Species of Concern Habitat
- Other Habitat
- Species at Risk Habitat

DILLON CONSULTING

MAP DRAWING INFORMATION:
DATA PROVIDED BY: Northern Pulp Nova Scotia, GeoNova, NSDNR

MAP CREATED BY: SCM
MAP CHECKED BY: SLD/AB
MAP PROJECTION: NAD 1983 UTM Zone 20N

0 0.25 0.5 1
Kilometres

PROJECT 17-0461 Date: 2018-04-19

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Table 3: Preliminary Potential SARA/COSEWIC Species within 5 km of Proposed Project (from ACCDC)

Common Name	Scientific Name	Federal Status* SARA/COSEWIC	Provincial Status* NSESA, Rarity Rank
Piping Plover melodus ssp.	*Charadrius melodus melodus*	Endangered	Endangered, S1B At Risk
Bank Swallow	*Riparia riparia*	Threatened	-, S2S3B May Be At Risk
Barn Swallow	*Hirundo rustica*	Threatened	Endangered, S2S3B At Risk
Bobolink	*Dolichonyx oryzivorus*	Threatened	Vulnerable, S3S4B Sensitive
Canada Warbler	*Wilsonia canadensis*	Threatened	Endangered, S3B At Risk
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened, S2B At Risk
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened, S2B At Risk
Wood Thrush	*Hylocichla mustelina*	Threatened	SUB Undetermined
Barrow's Goldeneye	*Bucephala islandica (Eastern pop.)*	Special Concern	-, S1N At Risk
Eastern Wood-Pewee	*Contopus virens*	Special Concern	Vulnerable, S3S4B Sensitive

- *Status as of January 2018

Of the species at risk reported within a 5 km radius, Piping Plovers were the only species listed as Endangered by SARA/COSEWIC. Species at Risk habitat (Piping Plovers) is identified for Lighthouse Beach (NSDNR Significant Habitat – **Figure 7**) based on historical nesting records. This beach is within 100 m of the potential pipeline corridor. Construction of the proposed pipeline will be conducted in a manner that does not disturb nesting birds and ECCC (Canadian Wildlife Service) will be consulted as part of the EA.

Seven species were identified as Threatened by SARA/COSEWIC. Of these birds, only Barn Swallows are expected to potentially nest within the terrestrial project footprint. Barn Swallow often build nests on man-made structures and prefer various types of open habitats for foraging. Potential suitable habitat could include buildings and trailers on the NPNS site and a search for nests on-site will be part of the birding surveys being conducted as part of the EA. It is unlikely that construction of the effluent will impact nesting barn swallows.

Two species were listed as Special Concern. Barrow's Goldeneye over winter in sheltered areas along the coast of Atlantic Canada from November to April, and the Eastern Wood-pewee is associated with forest clearings and edges.

In addition, although not listed by ACCDC within the general project area, the potential use of the site by SARA listed bat species will be assessed during the provincial EA.

Aquatic Species

Screening for potential aquatic Species at Risk included a broader review of aquatic ACCDC species, a search of the Ocean Biogeographic Information System (OBIS, 2017), available fisheries information

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from DFO (DFO, 2017) and a summary of recreational fisheries (Stantec, 2017). **Table 4** below provides a preliminary list of potential aquatic Species at Risk in the general area of the proposed project.

Table 4: Preliminary Potential Aquatic Species at Risk

Common Name	Scientific Name	Federal Status* SARA/COSEWIC	Provincial Status* NSESA,Rarity Rank
Striped Bass- Bay of Fundy pop.	*Morone saxatilis pop. 2*	(Not SARA Listed) /Endangered	S1B May Be At Risk
Striped Bass- Southern Gulf of St Lawrence pop.	*Morone saxatilis pop. 1*	(Not SARA Listed)/Special Concern	S2S3N May Be At Risk
Atlantic Salmon - Inner Bay of Fundy pop.	*Salmo salar pop. 1*	Endangered	S1 May Be At Risk
Atlantic Sturgeon	*Acipenser oxyrinchus*	(Not SARA Listed)/Threatened	S2 May Be At Risk
American Eel	*Anguilla rostrata*	(Not SARA Listed)/Threatened	S4 Secure
Gaspereau	*Alosa pseudoharengus*	-	S3 Sensitive
Harbour Porpoise - Northwest Atlantic pop.	*Phocoena phocoena (NW Atlantic pop.)*	Threatened/Special Concern	S4
Fin Whale - Atlantic Pop.	*Balaenoptera physalus*	Special Concern	-

- *Status as of January 2018

Cod and plaice are also listed under COSEWIC and potential will be reviewed. Additional potential aquatic (or semi aquatic) SARA/COSEWIC listed turtles (snapping turtle and wood turtle) are known for freshwater rivers in the wider area and although potential habitat is less likely with the brackish environments and not anticipated in the marine study area, potential for habitat will be assessed during the provincial EA.

6.3.1 Potential Effects and Mitigation in Relation to Species at Risk

Potential effects to Species at Risk could occur if construction activities on-land directly destroy bird nests (or turtle nests). Indirect disturbance may also occur during sensitive nesting periods (such as for Piping Plover if at Lighthouse Beach) during water-based construction. Consideration will be given to sensitive nesting windows during clearing activities and during pipeline/outfall construction activities to minimize potential effects. Larger marine mammals are not anticipated to reside or have important habitat within the vicinity of the proposed construction activity. Potential effects related to estuarine/ marine fish species could occur related to direct loss of habitat, sediment generation effects, or water quality changes including potential to affect fish migration. Mitigation related to fish Species at Risk will align with mitigation for fish habitat in general, including maintenance of fish passage and providing water quality that meets environmental criteria/background condition within 100 m of the outfall. Based on current information there is no federal Critical Habitat within the estuarine/marine footprint.

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7.0 Potential Effects: Indigenous Peoples

The land within and surrounding the project have been important to the Mi'kmaq and their ancestors prior to the arrival of European settlers. Pictou Landing First Nation is the most proximal Indigenous Community. NPNS is committed to upholding the process identified in the "Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia". The Guide identifies the following principles of engagement: mutual respect, early engagement, openness and transparency and adequate time to review/respond. NPNS recognizes that there are potential impacts associated with the project and have endeavoured to undertake meaningful engagement with the Mi'kmaq of Nova Scotia.

Several of the potential impacts of the project which would also impact the Mi'kmaq are discussed in other sections of this submission:

- Human Health – Health Canada has provided input regarding the assessment of potential human health impacts, with a particular focus on Pictou Landing First Nation(see **Section 5.2.1.1**).
- Socio-Economic Conditions – the potential for socio-economic impact to Indigenous peoples from the project overlaps with many other project impact assessments. **Section 7.1** provides information on the identified socio economic components and how they are being addressed.
- Physical and Cultural Heritage, Current use of Lands and Resources for Traditional Purposes – a Mi'kmaq Ecological Knowledge Study is underway. Refer to **Section 7.2** for more detail.
- Structures, Sites, or Things of Historical, Archaeological, Paleontological, or Architectural Significance – Assessment of archaeological and built heritage significance is summarized in **Section 7.3**. Paleontological resources are not anticipated to be in the study area and will be confirmed with the Museum of Natural History.

A summary of and results of engagement with Indigenous communities is provided in **Section 8.0**.

7.1 Socio Economic

Reflective of the project scope, the following socio economic components have been identified as having potential interaction with the Mi'kmaq and in particular Pictou Landing First Nation:

- Health and well-being:
  - Odour – Odour emissions will be reduced through the operation of the new facility relative to existing conditions due to the nature of the existing ETF process. **Section 4.1.3** provides additional information.
  - Visual – The visual effect from the effluent plume is expected to be negligible due to the design of the diffuser system. The identifiable visual effect will be colour. The water depth at the proposed location of the outfall pipe is 11.3 m (Mean Water Level). The mixing zone as modeled by the Receiving Water Study predicted that colour will reach background levels within 40 m of the diffuser ports. The effluent plume is predicted to reach the surface of the water at about 90 m from the diffuser, where the dilution ratio

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of the effluent is 102 times and water quality essentially meets background conditions. In the current system effluent flows undiffused over a six foot wide dam at the end of the Boat Harbour Basin into the Strait. It is the density of fresh water and warmer than the seawater so it enters the Strait as a visible plume that sits on top of the salt water and does not mix well. It often travels considerable distance before it mixes with the background waters of the Northumberland Strait.

- Land use and Physical Activities:
  - The understanding of traditional and existing land use and activities will be informed by the completion of a Mi'kmaq Ecological Knowledge Study, described in **Section 7.2**.
  - Pictou Landing First Nation has identified protection of recreational activities in the area as an interest. Temporary disturbance to marine based activities (e.g., boating) may occur during construction of the marine outfall. No permanent interaction is expected.
- Economic and Livelihood:
  - Potential interaction with fish and fish habitat will be relevant to commercial fishing and harvesting. As described in **Section 6.1** no significant impacts are anticipated in the marine environment. No permanent impact to fish and fish habitat is anticipated based on the operation of the outfall. Potential for impacts during construction are expected to be mitigated by adhering to environmental timing constraints, and will be assessed as the project proceeds.

7.2 Mi'kmaq Ecological Knowledge Study

A Mi'kmaq Ecological Knowledge Study (MEKS) study has been initiated by Membertou Geomatics as part of the EA. Following protocols, interviews will be held with members of PLFN, and Paq'tnkek Mi'kmaq Nation. The purpose of the MEKS is to make sure that the long-existing, unique and special relationship that the Mi'kmaq's have with the land and its resources is captured in the EA, including confirming the Mi'kmaq's current and traditional land uses and resources. The MEKS will gather and document the Mi'kmaq's collective body of ecological knowledge of the project area so that it is considered within the overall environmental effects of the proposed undertaking.

Based on the largely harbour and marine nature of the project, it is anticipated that the EA's focus on Fish and Fish Habitat, will be consistent with the conclusions and recommendations of the MEKS.

Though the on-land portion of the project is located on previously developed land, the presence of significant plants or medicines may be identified during the MEKS field review. If plants or medicines are identified within the construction impact area, the project team will work with the Mi'kmaq to identify an appropriate mitigation or offsetting plan such as facilitating the harvesting of the plant in advance of construction.

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7.3 Summary of Archaeological & Cultural Heritage Findings

Cultural Resource Management (CRM) was retained to undertake an archaeological assessment of the replacement ETF and new effluent outfall pipe. This included historical background research and site reconnaissance for an area of approximately 56 hectares of land within NPNS property that might be impacted by the replacement ETF. A preliminary assessment of the proposed route for the pipeline was also screened based on available data.

Background research indicates that Abercrombie Point, historically known as Fraser's Point, or Middle River Point was the site of an annual meeting for the Mi'kmaq of Nova Scotia, Prince Edward Island, and New Brunswick until the early-mid 1800s when a vessel containing small pox was quarantined in this area. Subsequent meetings were then held at Indian Island in Merigomish.

During background research and field reconnaissance, a portion of the terrestrial study area was identified as having high archaeological potential. A shovel testing program was undertaken in December, 2017; positive shovel tests indicate that there is a mixed archaeological site located within the potential project footprint.

Based on the archaeological investigation, the Proponent is modifying the facility design in order to accommodate identification of a sensitive feature. A buffer zone of 20 m of unaltered ground will be provided to protect the archeologically sensitive feature. Based on the preliminary design of the proposed ETF, accommodations will allow for the complete avoidance of the archaeological finding.

Background archaeological research indicated that there is high archaeological potential within a portion of the proposed marine routing of the pipeline based on known pre-contact archaeological sites, Indigenous burial sites and historic use of the harbour. The archaeological screening study recommends that field reconnaissance be conducted on the marine portion of the study area once the final route and footprint of the pipeline are confirmed. Field reconnaissance will be undertaken as the design progresses.

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8.0 Engagement

From the very early stages of the effluent treatment facility replacement project, Northern Pulp identified stakeholder engagement as a key priority that would be conducted throughout the environmental assessment pre-registration process.

To launch the EA process and begin widespread awareness and engagement on the project, the below steps were taken:

- Developed a project website to provide up to date information on the project and EA process;
- 20,000 Project Initiation Newsletters, which included the invitation to the first open house sessions, were mailed to residential and business addresses in Pictou County,
- Project Initiation was distributed to First Nations, government agencies and ministries, and stakeholder groups
- Placed ads in local and regional newspapers that included the project initiation and open house invitation.

A project website (www.NorthernPulpFuture.ca) was launched to provide interested members of the public with a central point to access updates on the progress of the EA and relevant reports. Since going live on November 5, 2017, the project website has received approximately 2,000 individual users through to April 1, 2018.

Significant feedback through comment forms, project emails, meetings and information sessions have been received. Many more conversations have occurred over the course of the project launch phase. These conversations, in addition to written feedback, provide valuable input to the project team to identify concerns, share information on the existing environment, and guide the detail design of the replacement ETF.

Engagement activities which occurred during the project launch are summarized in the 'What We Heard' project report, provided in **Appendix F**. The following sections provide a more specific summary of the nature and results of engaement with Indigenous Communities, public, and stakeholders.

8.1 Indigenous Communities and Community Entities

Pictou Landing First Nation has been engaged by the Province of Nova Scotia in Formal Consultation since March 2017 with respect to the conceptual and preliminary design of the replacement treatment facility, prior to the initiation of this Environmental Assessment. The proponent, NPNS, was included at meetings with Pictou Landing First Nation, OAA, and NSTIR held in April, August and November 2017 where the engineering design of the treatment facility and the Receiving Water Study were outlined in detail by the respective design engineering consultants from KSH and Stantec. The November 2017 meeting was expanded to include PLFN fishers to ensure their concerns were heard and addressed in

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the design. At that meeting an offer was made by NPNS to bring the PLFN Chief, as well as a few other members of the PLFN community, to visit similar effluent treatment systems at mills with marine outfalls and similar fishing grounds.

The proponent-led engagement as required by the Nova Scotia Environmental Assessment was initiated with the commencement of the EA study. Formal letters of Notice of EA Commencement were sent to Indigenous communities, and Community entities on December 01, 2017. Prior to the formal launch of the project in December, Dillon as the EA consultant was invited to the crown's November 2017 Formal Consultation session. NPNS and Dillon have since engaged with or attempted to engage with several Communities of the Mi'kmaq Nation of Nova Scotia following the guidance provided in the *Proponents Guide: The Role of Proponents in Crown Consultation with the Mi'Kmaq of Nova Scotia*, November 2012 (The Guide). Key engagement activities are listed below. Record and materials presented are found in **Appendix G**: NPNS Indigenous Engagement Log.

Correspondence including engagement letters and information packages were sent to:

- Dec 01, 2017: Pictou Landing First Nation; Notice of EA Commencement
- Dec 01, 2017: Kwilmu'kw Maw-klusuaqn Negotiation Office; Notice of EA Commencement
- Dec 01, 2017: Native Council of Nova Scotia; Notice of EA Commencement
- Dec 01, 2017: Nova Scotia Office of Aboriginal Affairs; Notice of EA Commencement
- Dec 12, 2017: Pictou Landing First Nation; Response to request for effluent discharge information
- Dec 21, 2017: Pictou Landing First Nation; Response to request for archeological information
- Jan 31, 2018: Sipekne'katik First Nation; Notice of EA Commencement
- Jan 31, 2018: Millbrook First Nation; Notice of EA Commencement

Engagement events completed by the Proponent and EA Consultant with Indigenous communities or Community Entities:

- Nov 23, 2017 (prior to public EA Commencement): Formal Consultation at OAA office with Pictou Landing First Nation, Proponent and Dillon EA consultant team.
- Jan 08, 2018: Pictou Landing First Nation community engagement session held at PLFN school gymnasium
- Jan 10, 2018: Native Council Nova Scotia information sharing meeting hosted by NCNS at NCNS office in Truro, NS

The following Communities or Community entities have requested to be kept informed:

- Pictou Landing First Nation
- Native Council of Nova Scotia: following the Jan 10/18 information sharing meeting, NCNS asked to be kept informed as the project EA progresses.

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Table 5: Summary of Formal Engagement Lead By the Government of Nova Scotia and Attended by the Proponent

Date	Attendees		Topics Discussed	Reference Document
April 26, 2017	Chief Andrea Paul (PLFN) Councillor Dominic Denny (PLFN) Councillor Barry Francis (PLFN) Councillor Derek Francis (PLFN) Councillor Gordie Prosper (PLFN) Councillor Haley Bernard (PLFN) Brian Hebert (PLFN Legal Counsel) Wayne Teasdale (PLFN Band Member)	Gary Porter (TIR) Beth Lewis (OAA) Beata Dera (OAA) Terri Fraser (NPNS) Kathy Cloutier (NPNS) Aaron Sarson (NPNS) Guy Martin (KSH)	Consultation Status Update Technical Review by KSH Determine Optimum Technology Preliminary Engineering Possible Outfalls Waiting on EA determination from NSE Discussion/Questions	Meeting Minutes KSH Presentation
August 25, 2017	Chief Andrea Paul (PLFN) Councillor Barry Francis (PLFN) Councillor Gordie Prosper (PLFN) Brian Hebert (PLFN Legal Counsel) Wayne Teasdale (PLFN Band Member) Gary Porter (TIR)	Beth Lewis (OAA) Beata Dera (OAA) Terri Fraser (NPNS) Michael Wilson (NPNS) Sam Salley (Stantec)	Consultation Status Update Process Update Schedule Update Receiving Water Study Discussion/Questions	Meeting Minutes Stantec Presentation
November 23, 2017	Chief Andrea Paul (PLFN) Councillor Barry Francis (PLFN) Brian Hebert (PLFN Legal Counsel) Wayne Teasdale (PLFN Band Member) Representatives from PLFN fishery Gary Porter (TIR) Lorrie Roberts (NSE) Helen Yeh (NSE)	Beth Lewis (OAA) Beata Dera (OAA) Terri Fraser (NPNS) Kathy Cloutier (NPNS) Wayne Gosse (NPNS) Sarah Devereaux (Dillon) Annamarie Burgess (Dillon) Karen March (Dillon)	Consultation Status Update Process Update EA Process Update Project Overview PLFN Questions Next Steps	Meeting Minutes NPNS Presentation

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8.2 Public, Stakeholders, and Local Government

Meetings held with the public, stakeholders, and local government are summarized in **Table 6**. Open house materials and presentations from the December 2017 and January 2018 sessions which launched the EA are provided in **Appendix H**.

Engagement has been ongoing in early 2018 through meetings with fisheries associations, Pictou Landing First Nation, federal and Nova Scotia provincial government agencies, and the Province of PEI Legislative Standing Committee on Agriculture and Fisheries.

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Table 6: Proponent Attended Sessions and Meetings

Date	Meeting	Attendees		Discussion Overview/Materials Presented
November 29-30,2016**	NPNS Employee Information Sessions	NPNS Employees		ETF Update to NPNS employees presented in house.
February 24, 2017**	Mill Tour with PLFN, and Government	Deputy Minister Paul LeFleche Gary Campbell (NS Lands President) Chief Andrea Paul (PLFN) NS Lands NPNS		Presentation and Mill Tour through the woodyard, bleach plant and warehouse
March 10, 2017**	Presentation to Local Government	Jim Ryan (Pictou Mayor) Malcolm Houser (Pictou Councillor) Dan Currie (Pictou Councillor) Eric Daley (Pictou Councillor) NPNS		Presentation on mill background, PEC, our product, best use of the tree, current effluent treatment facility history, precipitator, natural gas, economic impact study, range of employment at the mill and community involvement
May 1-3, 2017**	NPNS Employee Information Sessions	NPNS Employee		ETF Update to NPNS employees presented in house.
June 19, 2017**	NPNS Retiree Information Sessions	NPNS Retirees		ETF Update to NPNS employees presented in house.
July 21, 2017**	Presentation to Local and Provincial Government	Sean Fraser (MP) Nicole LeBlanc (Assistant to Sean Fraser) Jim Ryan (Pictou Mayor) Lisa MacDonald (New Glasgow CAO) Karla MacFarlane (MLA)	Deborah Wadden (Pictou County Municipal Warden) Robert Parker (Pictou County Municipal Warden) Nancy Dicks (New Glasgow Mayor) Pat Dunn (MLA) Tim Houston (MLA) NSTIR NPNS NPNS Board Members	Update presentation on the new effluent treatment plant and discussions
September 18-20, 2017**	NPNS Employee Information Sessions	NPNS Employees		ETF Update to NPNS employees presented in house.
September 22, 2017**	Presentation and Mill Tour with PLFN	Gordie Prosper (PLFN) Wayne Teasdale (CEO PLFN) Barry Francis (PLFN) NPNS		Presentation and Mill Tour

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Date	Meeting	Attendees	Discussion Overview/Materials Presented
October 4, 2017**	Forestry Stakeholders Session (Session 1 of 2, at PC Chamber of Commerce)	Forestry Stakeholders NPNS	Presentation and overview of the ETF project
October 5, 2017**	Presentation to local government	Nancy Dicks (New Glasgow Mayor) Lisa MacDonald (New Glasgow CAO) Troy McCullough (New Glasgow Councillor) Jim Ryan (Pictou Mayor) Dan Currie (Pictou Councillor) Malcolm Houser (Pictou Councillor) Lenny White (Westville Councillor) Robert Parker (Pictou County Municipal Warden) Deborah Wadden (Pictou County Municipal Warden) Andy Thompson (Pictou County Municipal Warden) David Parker (Pictou County Municipal Warden) NPNS	Presentation on mill background, PEC, our product, best use of the tree, pulping process, effluent treatment process at Boat Harbour, effluent quality, economic impact, recent significant projects, preliminary layout of new ETF and receiving water study
October 12, 2017**	Forestry Stakeholders Session (Session 2 of 2, at Quality Inn, Enfield)	Forestry Stakeholders NPNS	Presentation and overview of the ETF project
October 11, 2017**	Presentation to Provincial Government	Jamie Baillie (Opposition Leader) NPNS	Overview of ETF
October 25, 2017**	Presentation to Business Stakeholders	PC Chamber of Commerce Board of Directors	Receiving Water Study
November 27-29, 2017	NPNS Employee Information Sessions	NPNS Employees	ETF Update
December 4, 2017	Meeting with Commercial Fisheries Stakeholder Groups and Fishermen	Approximately 200 individuals representing various commercial fishing interests from the three Atlantic Provinces. NPNS KSH Dillon	PIC Panels

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Date	Meeting	Attendees	Discussion Overview/Materials Presented
December 5, 2017	Presentation to Provincial and Local Government	Tim Houston (MLA) Karla MacFarlane (MLA) Pat Dunn (MLA) Pictou County municipal representatives	PIC Panels
December 6, 2017	Public Open Houses	Public Information Session Various Pictou County municipalities Dillon KSH NPNS	PIC Panels
December 21, 2017	Meeting with Commercial Fisheries Stakeholder Groups	Leadership from: Northumberland Fishermen's Association Gulf Nova Scotia Fishermen's Association Gulf Nova Scotia Fleet Planning Board PEI Fishermen's Association Gulf Nova Scotia Bonafide Fishermen's Association Maritime Fishermen's Union Local 4 Inverness South Fishermen's Association Dillon KSH NPNS	Discussion topics were receiving water study, lobster larvae study, project website, closed loop system, effluent pipe, provincial/federal government involvement, change of project direction, protection of the resource, timing and approval of EA and next steps
January 10, 2018	Engagement with NCNS	Native Council of Nova Scotia NPNS KSH Dillon	Presentation on mill background, product, effluent treatment process at Boat Harbour, preliminary layout of new ETF and receiving water study. PIC panels.
January 23, 2018	Presentation to Public/Stakeholder	Rotary Club of New Glasgow NPNS	PIC Panels

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Date	Meeting	Attendees	Discussion Overview/Materials Presented
January 24, 2018	Presentation to Provincial Government	NDP Caucasus: Tammy Martin (MLA) Susan LeBlanc (MLA) Claudia Chender (MLA) Gary Burrill (MLA) Lisa Roberts (MLA) Dave Wilson (MLA) Lenore Zann (MLA) Charlie Mancini Joanne Hussey (Deputy Chief of Staff) NPNS UNIFOR Local 440 KSH	PIC Panels
January 26, 2018	Presentation to Members of Provincial Government	Karla MacFarlane (MLA) Tim Houston (MLA) NPNS	PIC Panels
February 2, 2018	Presentation to Members of Provincial Government and Staff	John Lohr Martha MacQuarrie Steve Outhouse NPNS UNIFOR Union Local 440	Presentation on mill background, our product, paper excellence, forestry in Nova Scotia, best use of the tree, precipitator, air quality, history of effluent treatment plant, effluent quality, preliminary layout of new ETF, AST, ETF replacement, Boat Harbour remediation, receiving water study, consultation avenues for EA, community involvement and economic impact
February 8, 2018	Meeting with Commercial Fisheries Stakeholder Groups, PLFN	PLFN Leadership from: Northumberland Fishermen's Association Gulf Nova Scotia Fishermen's Association Gulf Nova Scotia Fleet Planning Board PEI Fishermen's Association Gulf Nova Scotia Bonafide Fishermen's Association Maritime Fishermen's Union Local 4 Dillon NPNS	Discussion topics were receiving water study, market analysis, lobster studies, options considered for alternative effluent disposal methods and further areas of review necessary

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Date	Meeting	Attendees	Discussion Overview/Materials Presented
February 15, 2018	Meeting with Member of Provincial Government	Geoff MacLellan (MLA) NS Lands NSTIR NPNS	Presentation and Mill Tour
February 16, 2018	Presentation to PEI Provincial Government	PEI Legislature (Standing Committee on the Agriculture and Fisheries) Dillon KSH NPNS	Project overview presentation and response to questions. Presentation Attached and Legislature Transcript
February 20, 2018	Meeting with Commercial Fisheries Stakeholder Groups	Leadership from: Northumberland Fishermen's Association Gulf Nova Scotia Fishermen's Association Gulf Nova Scotia Fleet Planning Board PEI Fishermen's Association Gulf Nova Scotia Bonafide Fishermen's Association Maritime Fishermen's Union Local 4 Stantec Dillon NPNS	Stantec presentation, materials included in Appendix. Fisher`s Minutes
February 22, 2018	Presentation to Members of Provincial Government	Cecil Clarke (MLA) Alfie MacLeod (MLA) NPNS	Presentation and Mill Tour
April 7, 2018	Presentation to Forestry Stakeholder	Central Region Woodlot AGM	Update on ETF project
April 9, 2018	Meeting with Fisheries Stakeholder Group	Representatives from the Atlantic Salmon Federation NPNS NPNS Dillon	PIC Panels Overview of the RWS & model results

** Prior to EA Project Launch

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8.3 Ministries and Agencies Contacted to Date

Provincial ministries and federal agencies which will be involved with the EA and future permitting for the project have been contacted and informed of the project in order to confirm agency areas of interest and study expectations. By understanding the requirements of each ministry the Project Team is in a better position to prepare a complete EA and understand post EA and permitting requirements.

Additional information on the future permitting and approvals required is presented in **Section 5.2** (federal) and **Section 9.0** (provincial)

Ministries and Agencies who have been engaged to date include:

- Nova Scotia Environment
- Nova Scotia Department of Natural Resources
- Nova Scotia Office of Aboriginal Affairs
- Department of Fisheries and Oceans
- Transport Canada
- Environment and Climate Change Canada
- Health Canada

8.4 Results of Engagement (Indigenous Communities, Public, and Stakeholder)

Across all discussions and feedback received, a consistent set of themes have been identified. **Table 7** summarizes the themes of comments provided, where they have been heard, and how it is being addressed or incorporated in the project.

8.5 Future Engagement Events

As a corporate citizen tightly connected to the community and province at large with many current employees, contractors and retirees continuing to reside in the Pictou County and surrounding region NPNS recognizes the importance of engagement throughout the entire EA process. Extensive engagement will continue throughout this project.

A second series of engagement meetings are anticipated in late spring 2018 will: show how comments received to date have been addressed and incorporated in the project; present the recommended ETF facility design and construction approach, environmental mitigations, and next steps. As during the EA launch process in late 2017, advance sessions will be held for Pictou Landing First Nations, commercial fisheries, and government.

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Table 7: Results of Engagement: Themes of Comments Received and How Addressed

Comment Received From	Comment Theme	How Comment Will Be Addressed by the Project
• Government agencies • Pictou Landing First Nation • Fisheries groups • Stakeholders • General public	Water quality/Marine Protection	• Effluent will be treated on land. Removes risk of a future leak of untreated effluent in the aquatic environment that exists with current facility. • Contingency/emergency response plans will be developed. An emergency spill basin will be constructed as part of the replacement ETF so that no untreated effluent reaches the marine environment. • RWS completed to site the outfall. Results of modeling show that recommended location and using a six port diffuser means that water quality meets baseline conditions within 100m or less of the diffuser. • Environmental Effects Monitoring and other future studies will be carried out to monitor for potential unforeseen effects from the project.
• Government agencies • Pictou Landing First Nation • Commercial fisheries • Stakeholders • General public	Commercial Fisheries/ American Lobster	• An expert from Mount Allison University, who was recommended by commercial fisheries representatives, has been retained to provide advice on the potential impact of the project on American lobsters. • Construction will be staged in order to minimize or avoid conflict with commercial fishing activities. • Planning of construction activities will include mitigation in relation to effects on the marine environment
• Government agencies • Pictou Landing First Nation	Archaeological Resources	• An archaeological site was identified on Abercrombie Point within the preliminary facility foot print. The design of the replacement ETF has now been modified to protect the archaeological resources. • The routing of the pipeline has potential to effect archaeological resources. An underwater video survey and marine floor investigation will be used to finalize the routing to mitigate impacts to archaeological resources.
• Government agencies, • Pictou Landing First Nation	Indigenous relationship with the land and its resources	• A MEKS study is currently underway and the results will inform the project approach. Mitigation measures will be identified based on the MEKS findings. For example, if significant plants or medicines are identified on land, it is anticipated they would be either protected, or harvested by the Mi'kmaq, in advance of construction.

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Comment Received From	Comment Theme	How Comment Will Be Addressed by the Project
• Government agencies • Pictou Landing First Nation • Stakeholders • General public	Human Health, Air Quality and Noise	• Design options to reduce odor have been incorporated into the facility design. An AST system improves odor relative to existing conditions. • Air quality is not expected to be altered from the burning of the sludge in the existing boilers. An air quality impact assessment is underway and mitigation measures will be incorporated as necessary. • Mitigation measures for noise will be determined as the design progresses and a construction methodology is developed. • A study on human health using a risk based approach will be completed as part of the EA including effects due to human consumption of fish. This will tie in closely with the evaluation of the marine environment.
• Government agencies • Foresters • General public	Socio-Economic Impacts (Potential Mill Closure)	• The operation of a new replacement ETF is required for the continued operation of NPNS. NPNS is critical to Nova Scotia's forestry industry, the regional economy as a direct and indirect employer
• Government agencies • Pictou Landing First Nation • Stakeholders • General public	Facility Design and Alternatives	• Market analysis confirmed that for NPNS to continue to be a viable mill, it should maintain the existing product and therefore existing mill type. A replacement ETF is therefore required – a closed loop system (possible only if the mill changed production type) is not feasible. • Alternative ETF options were reviewed. An AST system is the most reliable and appropriate solution for the NPNS facility. • Alternative outfall designs and locations were reviewed. A marine outfall is considered to be the appropriate solution. • The location of the marine outfall was identified to meet regulatory criteria and best practices

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9.0 Potential Provincial Approvals

Nova Scotia Environment (EA Branch) has indicated that they will continue to seek input from federal agencies when reviewing the Registration Document. It is understood that input will be provided by several federal agencies, as outlined in **Section 5.2.1.**

In addition to the provincial EA process, the project is anticipated to require the following provincial approvals/permits:

- Wetland alteration approval
  - Expected approval requirement due to footprint of spill basin being in conflict with a potential wetland
- Waterlot usage during construction
  - Crown land easements, leases, and licenses for construction of the effluent pipeline through Pictou Harbour
  - Crown land easements, leases and licenses for the construction of the outfall
- Nova Scotia Special Places
  - Archaeolgoical assessment has been carried out following the *Special Places Act*. A small Pre-contact archaeological site was identified. The footprint of the proposed ETF will be modified to avoid the limits of the archaeological site and maintain a buffer of unaltered land.
  - Potential for habour/marine resources will be assessed as part of underwater investigations underway in spring 2018.
- Construction related approvals/permit
  - Temporary fuel storage, transportation, and public highway use are additional approvals potentially required for construction activities

Additional provincial permitting may be identified during the Environmental Assessment process and will be identified and/or addressed in the provincial Registration Document.

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10.0 Closure

The discharge of effluent into the Northumberland Strait has been ongoing for over fifty years. The effluent quality since NPNS took over operation of the effluent treatment system have improved and meet the required discharge criteria for effluent quality, including seven rounds of environmental effects monitoring (EEM).

The new ETF facility has been designed to meet or exceed established federal and provincial regulations for the marine outfall. It will provide an improved effluent quality as compared to today. A Receiving Water Study (RWS), including both far and near field assessments, has been conducted to determine an appropriate location for a new outfall. The preliminary engineering design indicates that direct marine impacts from water quality will be dispersed within 100 m from the diffuser. The influence of the effluent will not be far-reaching into the Northumberland Strait. It is expected that ongoing monitoring for the new facility will be required including environmental effects monitoring. A new monitoring program will be proposed in the EA Registration for review.

The project has been designated as a Class 1 Environmental Assessment by Nova Scotia Environment (NSE). In an NSE Class 1 process it is the responsibility of the proponent to demonstrate that the project is acceptable to proceed by predicting and evaluating the environmental effects of the proposed undertaking. In the Registration Document which will be submitted as the culmination of the EA study, a project description and assessment will be provided including the ecosystem components, the potential for impact and corresponding mitigations. The recommendations for environmental monitoring during the life of the project will be further refined and/or confirmed during the permitting processes. Under the Nova Scotia EA it is also the responsibility of the proponent to engage the First Nations, local communities, and stakeholders in order to understand concerns and mitigate them where possible.

Engagement has been carried out to hear the concerns of these groups, and engagement will continue throughout the completion of the EA Study. Input has been obtained from Indigenous communities, commercial fishing industries, recreational fisheries and local community groups. Input received has shaped the project and EA studies undertaken. For example, a market study was undertaken to address the closed loop effluent question arising from the fishers and confirm that altering the product produced at NPNS is not a viable economical alternative to an effluent outfall. In addition, a study was commissioned with a lobster expert to assess the impact of effluent to the lobster fishery.

Impact assessments are in progress. No significant effects are expected from the construction, operation, and maintenance of the proposed facility based on preliminary results and incorporation of standard mitigation measures and appropriate design planning. The provincial assessment will address key areas such as Fish and Fish Habitat, Migratory Birds, Species At Risk, federal lands, socio-economic and Indigenous Peoples.

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Many levels of government agencies have already been contacted and will continue to be engaged throughout the remainder of the EA and into future permitting stages. This includes Nova Scotia Environment, Nova Scotia Department of Natural Resources, Transport Canada, Health Canada, Department of Fisheries and Oceans Canada, and Environment and Climate Change Canada. The ongoing engagement with these regulators is shaping the development of the EA Registration document, one example, is ongoing discussions with Health Canada to include an assessment of human health risks.

From these many avenues and voices a complete picture of the interests surrounding this project has been obtained, and therefore, a thorough Registration Document will be submitted to the Nova Scotia Minister of Environment. The Registration Document will also be written to facilitate the Section 67 review by federal agencies.

As the above submission demonstrates, the proposed effluent treatment facility design remains consistent with the project description provided to CEAA and other agencies and regulators back in 2017. The scope of the project does not fall within CEAA's Designated Activities.

Northern Pulp and owner Paper Excellence are fully committed to undertaking all measures within their ability to ensure there is a new treatment facility in operation by January 2020 in order to comply with the *Boat Harbour Act* legislation. As corporate citizens who continue to strive to reduce their environmental footprint, and who are committed to the continued success of both the forestry and fishing industries in Nova Scotia, NPNS thanks CEAA for its attention to this important project.

As we await the Agency's determination, we will continue to move forward in keeping with our timeline of registering the Class 1 EA document to NSE in July of 2018.

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Appendix A

Preliminary Engineering for Effluent Treatment Facility Replacement – Technology Selection Summary

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Appendix B

NPNS Global Market Study

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Appendix C

Receiving Water Study

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Appendix D

Environmental Effects Monitoring, Cycle 7

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Appendix E

Middle River Study

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Appendix F

What We Heard

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Appendix G

Indigenous Engagement Log

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Appendix H

Engagement Materials

s.19(1)

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Jalloh, Rugi

From: MacDougall, Hugh <[redacted]>
Sent: April-09-18 1:33 PM
To: Jalloh, Rugi
Cc: Fraser, Terri; Wilson, Michael; Glen Gilbert
Subject: RE: Northern Pulp Nova Scotia EA: Marine Geotechnical/Harbour Bottom Video Survey
Attachments: RE: DFO Review of Video Plan

Categories: Red Category

Rugi,

I am the project engineer at Northern Pulp assigned to the Effluent Treatment Project.

To address your concern for the extent of the side-scan sonar we contacted CSR for their intentions. The e-mail attached from CSR confirms they will be going 100m beyond the outfall structure location.

Hugh MacDougall P. Eng.
Senior Project Engineer
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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www.paperexcellence.com

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Since its inaugural year in 2010, Paper Excellence Canada (PEC) has evolved from a new entrant as an exporter to a leader in Canada's value-added natural resources (pulp) industry. Achieving sales in excess of $1 billion through its seven Canadian mills, PEC has accomplished this level of sales volume through innovation and best practices in all areas with a commitment to deliver premium quality products to all customers. Through its Richmond-based headquarters which hosts an employee base of 100 supporting over 2300 employees in Canada and Europe, PEC continues to lead by example operating through economic and environmentally sustainable best practices.

From: Wilson, Michael
Sent: April-09-18 12:13 PM
To: MacDougall, Hugh <[redacted]>
Cc: Fraser, Terri <terri.fraser@northernpulp.com>
Subject: FW: Northern Pulp Nova Scotia EA: Marine Geotechnical/Harbour Bottom Video Survey

Here is the feedback from DFO.

Regards,

Mike Wilson

Environmental Leader
Northern Pulp Nova Scotia Corporation • 260 Granton Abercrombie Branch rd, Abercrombie NS Canada • B2H 5E6
☎ : 902.752.8461 x315 • 📱 : 902.754.3630 • ✉ : michael.wilson@northernpulp.com

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From: March, Karen [redacted]
Sent: Monday, April 09, 2018 11:24 AM
To: Wilson, Michael
Cc: Annamarie Burgess; Devereaux, Sarah
Subject: Fwd: Northern Pulp Nova Scotia EA: Marine Geotechnical/Harbour Bottom Video Survey

Here is the request, thanks
---------- Forwarded message ----------
From: **Jalloh, Rugi** <Rugi.Jalloh@dfo-mpo.gc.ca>
Date: Mon, Apr 9, 2018 at 11:15 AM
Subject: RE: Northern Pulp Nova Scotia EA: Marine Geotechnical/Harbour Bottom Video Survey
To: "Burgess, Annamarie" <aburgess@dillon.ca>
Cc: "March, Karen" [redacted] Sarah Devereaux <SDevereaux@dillon.ca>, "Smith, Colleen A" <Colleen.Smith@dfo-mpo.gc.ca>

Hello Annamarie,

Thank you for the information and as per conversation on Friday, I indicated that I will review it today and get back to you with feedback.

I reviewed the document entitled "Effluent Treatment Plant Replacement Project, Abercrombie Point, Nova Scotia – Proposed Methodology for the Harbour Bottom Investigation" Prepared by Stantec Consulting Ltd., dated April 5, 2018.

Section 1.2 The Scope, 2nd paragraph: It is stated that the side –scan sonar data will be conducted in a manner to cover the entire 200m wide outfall route and at the diffuser location, as well as **50 m** further out on each side of the route. However, DFO-FPP requested the placement of a transect along the entire length of the proposed marine outfall and **100 m** beyond the structure to determine the benthic habitat. Please let me know if there are any limitations regarding this request.

We do not have any comments on the Marine Geotechnical Investigation report.

Thanks,

Ms. Rugi Jalloh, Fisheries Protection Biologist

Ecosystem Management/Gestions des écosytèmes

Fisheries and Oceans Canada/Pêches et Océons Canada

Tel/ tél: 902-401-0897

Fax/ téléc: 902-426-1489

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1 Challenger Dr./1 promenade Challenger

P.O. Box/C.P. 1006, Station P410

Dartmouth, NS/NE B2Y 4A2

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: April-06-18 1:28 PM
To: Jalloh, Rugi; Smith, Colleen A
Cc: March, Karen; Sarah Devereaux
Subject: Northern Pulp Nova Scotia EA: Marine Geotechnical/Harbour Bottom Video Survey

Good afternoon Rugi, Colleen,

Attached are plans for the advance surveys for marine geotechnical and harbour bottom video to allow for the detail design of the replacement Effluent Treatment Facility at Northern Pulp Nova Scotia.

The work is anticipated to be undertaken early next week - possibly as soon as Monday if weather permits.

Regards,

Annamarie Burgess
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca
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--



Karen March
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
www.dillon.ca

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Smith, Lisa

From: Glen Gilbert
Sent: April-09-18 10:39 AM
To: MacDougall, Hugh
Cc: Wilson, Michael; Fraser, Terri; 'Patrick Campbell';
Subject: RE: DFO Review of Video Plan

Hi Hugh,

Yes It does extend to 100m beyond the outfall.

Best regards, Glen

From: MacDougall, Hugh
Sent: April-09-18 11:32 AM
To: Glen Gilbert
Cc: Wilson, Michael; Fraser, Terri
Subject: FW: DFO Review of Video Plan

Glen,

A heads up – see below. Does the survey extend to the 100 m requested beyond the actual outfall location?

Hugh MacDougall P. Eng.
Senior Project Engineer
Northern Pulp Nova Scotia
P: (902) 752-8461

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From: Wilson, Michael
Sent: April-09-18 11:00 AM
To: MacDougall, Hugh
Cc: Fraser, Terri <terri.fraser@northernpulp.com>
Subject: FW: DFO Review of Video Plan

FYI

Regards,

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Mike Wilson

Environmental Leader
Northern Pulp Nova Scotia Corporation • 260 Granton Abercrombie Branch rd, Abercrombie NS Canada • B2H 5E6
☎ : 902.752.8461 x315 • [redacted] : 902.754.3630 • ✉ : michael.wilson@northernpulp.com

Please consider the environment before printing this email.

From: March, Karen [redacted]
Sent: Monday, April 09, 2018 10:24 AM
To: Annamarie Burgess; Wilson, Michael
Cc: Devereaux, Sarah
Subject: DFO Review of Video Plan

Hi - I just heard from Rugi (DFO) that consistent with their original request, DFO would like the side scan sonar to extend 100 m beyond the outfall. The Stantec plan identifies 200 m along the pipe plus 50 m. It is not clear if the survey extends to the 100 m requested beyond the actual outfall location. Rugi is going to send a note requesting that it do so.

Karen

--

[redacted]
Karen March
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
www.dillon.ca

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Effluent Treatment Plant Replacement Project Abercrombie Point, Nova Scotia – Proposed Methodology for Harbour Bottom Investigation

Stantec

Prepared for:
Northern Pulp Nova Scotia Corporation
P.O. Box 549, Station Main
New Glasgow, NS B2H 5E8

Prepared by:
Stantec Consulting Ltd.
102 – 40 Highfield Park Drive
Dartmouth, Nova Scotia
B3A 0A3

April 5, 2018

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Figure 1 Proposed Pipeline Route and Underwater Survey Area for Effluent Treatment Plant Replacement Project, Abercrombie Point, NS 3

LIST OF APPENDICES

Appendix A Underwater Camera Specifications

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EFFLUENT TREATMENT PLANT REPLACEMENT PROJECT ABERCROMBIE POINT, NOVA SCOTIA – PROPOSED METHODOLOGY FOR HARBOUR BOTTOM INVESTIGATION

April 5, 2018

1.0 INTRODUCTION

Paper Excellence Canada is planning to replace the existing effluent treatment system at the Northern Pulp mill on Abercrombie Point, NS. The system will be replaced with a new wastewater treatment plant, including a new marine effluent outfall. To carry out this project, a marine geotechnical and harbour bottom video investigation of the proposed route for the new submerged effluent outfall within Pictou Harbour and the Northumberland Strait is required.

1.1 THE PURPOSE

On behalf of Northern Pulp Nova Scotia Corporation (NPNS), Stantec Consulting Ltd. (Stantec) is hereby submitting a proposed marine benthic habitat video survey plan to the Department of Fisheries and Oceans (DFO) for review and comment and/or approval. An underwater benthic habitat survey (UBHS) report, including information on the existing Study Area will be prepared for submission to DFO. The purpose of the marine benthic habitat video survey is to characterize fish and fish habitat in the footprint of the outfall pipeline route within Pictou Harbour and the Northumberland Strait. As a result of the video survey, baseline information will be collected on the existing environment within the Project area, which will be used to aid in permitting with DFO and NSE.

In addition, the objective of the video survey and the proposed marine geophysical (side-scan sonar and magnetometer) surveys are to assist with analyzing for potential marine archaeological resources; therefore, this plan is provided as well to the Special Places Coordinator, who reviews archaeological permits and reports for the Province of Nova Scotia, to determine whether the proposed survey plan will suffice for the underwater archaeological reconnaissance.

1.2 THE SCOPE

Underwater video images collected in association with side-scan sonar data will be the most appropriate data to collect for characterizing the benthic habitat, including surficial substrate type and marine macrofauna and macroflora in the footprint of the proposed subsea effluent pipeline.

A visual survey of the entire proposed outfall routing will be conducted after the results from the side-scan sonar and magnetometer surveys are conducted. The side-scan sonar survey will be conducted in manner as such to cover the entire 200-m wide outfall route and at the diffuser location, as well as, 50 m further out on each side of the route for reference purposes (refer to Figure 1). The underwater video survey will be conducted by a Canadian Seabed Research (CSR) surveyor with a high definition drop camera, under the direction and supervision of a Stantec marine scientist and will be collected as per the DFO Underwater Video Site Survey Guidelines (1999). A Stantec marine scientist will analyze the video post-survey as part of the Underwater Benthic Habitat Survey (UBHS) report.

A [redacted] Camera [redacted] (refer to Appendix A for technical details of the camera system) will be used to conduct the underwater video inspection of the proposed centreline pipeline route from a CSR research vessel (refer to Figure 1 for the proposed centreline route). The

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camera in the water, situated directly below the GPS antenna on the survey vessel, will be slowly towed and where the video will have overlay GPS coordinates so that the camera's position is available on the recorded video image at all times. The camera will fly at an altitude above the seafloor that will maximize the swath of the route observed while still maintaining visual clarity of the seafloor substrate, macroflora, and macrofauna. This altitude will be determined in the field based on water clarity. Habitat types will be identified on the basis of the results from the side-scan sonar survey and confirmed in the field by the marine scientist based on substrate, macroflora, and macrofauna visual observations in the video. Representative reference locations will be video surveyed outside of the proposed outfall route for each habitat type identified.

In the event that eelgrass (*Zostera marina*) beds are identified during the side-scan sonar survey, each bed will be verified for the presence of eelgrass by conducting underwater video ground truthing. Eelgrass beds will be delineated on side-scan sonar maps. This will allow for the location of the bed and its extent to be mapped out for future use.

As a deliverable for the UBHS work, a final summary report and corresponding video footage will be provided to Northern Pulp and DFO. The report will include study objectives, a site diagram illustrating transect locations, a table providing transect coordinates in NAD 83 datum, field methods used, interpretation of the underwater video and any limitations that may be present.

The underwater video will also be reviewed by a Stantec marine archeologist and where noticeable side-scan sonar anthropogenic features and magnetometer targets identified during those surveys will also be surveyed with the video camera. The side-scan sonar survey will provide 100% coverage of the pipeline corridor using a [redacted] and the magnetometer survey will be conducted using a [redacted] Marine Magnetometer along the proposed centreline route for the pipe. A Stantec marine archaeologist will review the resulting data from the video survey including any additional remote sensing and geophysical surveys conducted along with the video. This will include the review of the data and the preparation of a memo detailing the results of the survey as it pertains to marine archaeology and will make recommendations for any additional archaeological reconnaissance or screening, if required.

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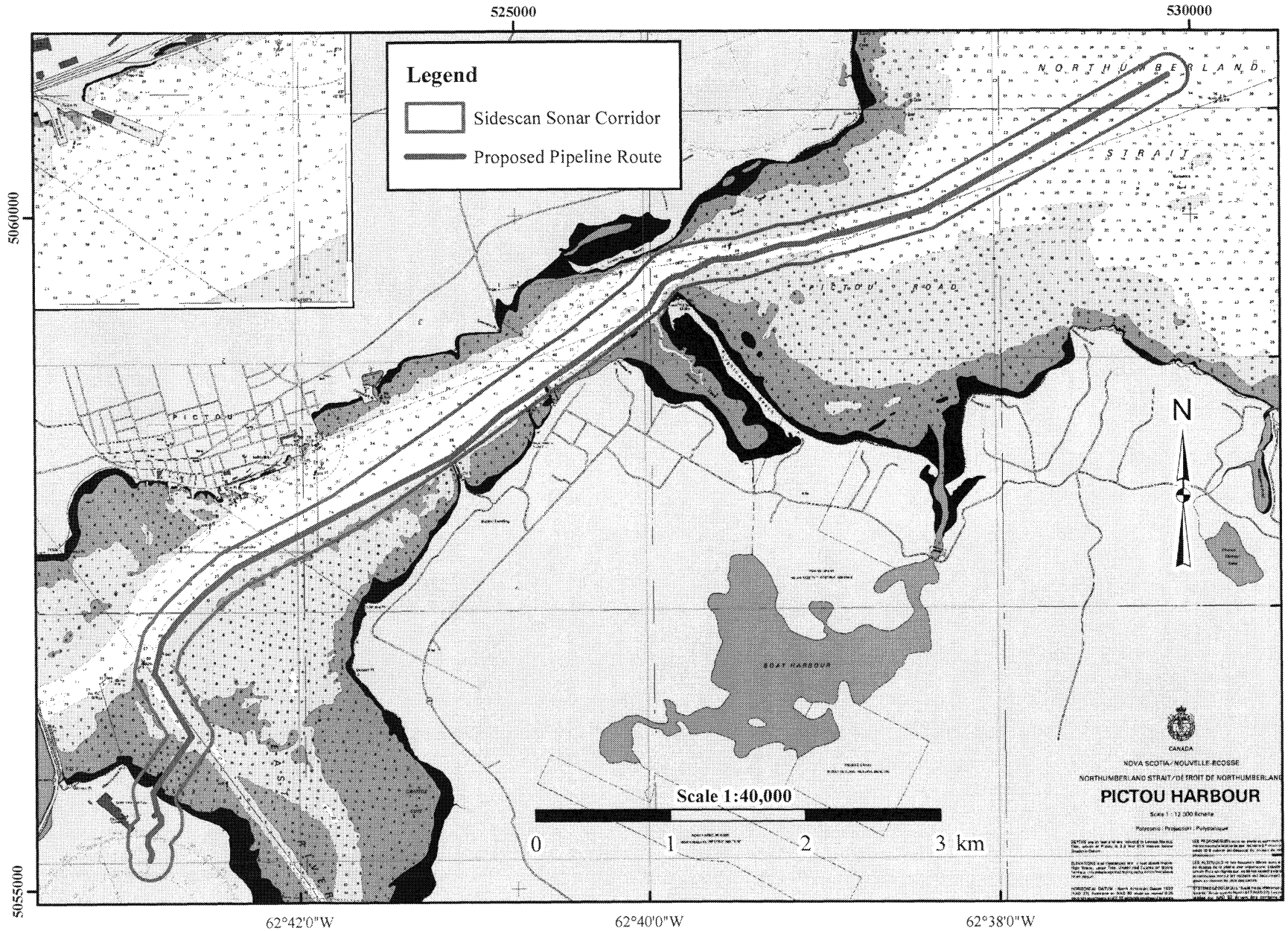


Figure 1 - Proposed Pipeline Route and Underwater Survey Area for Effluent Treatment Plant Replacement Project, Abercrombie Point, NS.

CSR GeoSurveys Ltd.

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2.0 FISH HABITAT CHARACTERIZATION

Side-scan sonar data will be used to assist mapping of distinct habitat types of the seafloor of the proposed outfall route and at the location of the diffuser. This mapping will initially be used by a Stantec marine scientist to determine key habitat types based on substrate classifications observed. A high-level video analysis will be conducted on the entire length of the proposed route to validate areas of key habitat types characterized by the side-scan sonar data, as well as to identify any anthropogenic features within the route. Once key habitat types have been identified through the aide of side-scan sonar and high-level video reviews, portions of each habitat type (up to 2 kilometres total) as well as at the diffuser location will be reviewed in higher detail. It is assumed that there will be three to four habitat types within the outfall route based on past experience and existing information. Approximately 500 m of each habitat type will therefore be reviewed in higher detail and for the location of the diffuser.

A detailed review of each habitat type characterized will be conducted in a manner as to identify macroflora and macrofauna species distributions to the lowest possible taxonomic level and will be presented as a percentage of substrate covered in 50-m increments of the seabed. This method has been typically used for underwater benthic habitat surveys of relatively long linear routes. Substrate type will be determined according to the following classifications:

- Bedrock
- Boulder (>25 cm)
- Cobble (3-13 cm)
- Gravel (2-3 cm)
- Sands
- Clay Silt
- Organic
- Shell Hash

Macrofaunal species distributions will be classified based on the following categories:

- A = Abundant; numerous (not quantifiable) observations made in the field of view throughout the entire habitat segment.
- C = Common; numerous (not quantifiable) observations made in the field of view intermittently along the habitat segment.
- O = Occasional; quantifiable observations made in the field of view intermittently along the habitat segment.
- U = Uncommon; quantifiable observations made in the field of view infrequently along the habitat segment.

An underwater benthic habitat survey report will be created outlining the key habitat types including macroflora, macrofauna, and substrate identified along the proposed outfall route and at the diffuser location. A summary table as well as habitat mapping of the outfall route will be incorporated into the report. Habitat mapping will outline key habitat types characterized as well as key macroflora and macrofauna.

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3.0 QUALITY ASSURANCE AND QUALITY CONTROL

Stantec's Quality Management System has ISO9001:2008 certification which requires peer-reviewed engineering design and scientific reporting deliverables to be followed across all operations.

QA/QC procedures are essential to produce data that meet an acceptable level of quality, is legally defensible, and that the level of quality is adequately documented. QA/QC procedures being with simple project design, and carry through the whole process including sample collection, sample shipment, sample storage, sample analysis, data management, data transfer, and reporting.

Stantec has established QA/QC procedures that are reflective of best practices and are consistent with those outlined in DFO's Underwater Video Site Survey Guidelines (1999).

To confirm that the work was carried out as planned the on-site Stantec field person will be specifically asked to confirm that the coordinates supplied were correct and used in the field. If refinement of coordinates is required on site because of obstacles on or in the water, the on-site Stantec person will record and provide the alternate coordinates used for the work.

4.0 CLOSURE

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report and the referenced documents. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken.

This report represents the best professional judgment of Stantec personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

STANTEC CONSULTING LTD.

Prepared by:

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Date: 2018.04.05 13:29:20 -03'00'

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APPENDIX A
UNDERWATER CAMERA SPECIFICATIONS

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is withheld pursuant to sections
est retenue en vertu des articles

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TECHNICAL INFORMATION

Marine Geotechnical Investigation For the Proposed Northern Pulp Pipeline, Pictou Harbour

Submitted To

Prepared by:

CSR GeoSurveys Ltd.
341 Myra Road, Porters Lake
Nova Scotia, Canada B3E 1G2
Telephone: 902-827-4200
Email: [redacted]

and

Stantec Consulting Ltd.
Dartmouth NS

CSR Job Number: 1806

Date: March 28, 2018

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Northern Pulp NS Corp. Marine Geotechnical Program Information

March 28, 2018

Marc Theriault, NSE Inspector for Pictou County marc.theriault@novascotia.ca
Kathleen Johnson, NSE Engineer, johnsok@gov.ns.ca
and
Ms. Rugi Jalloh, Fisheries Protection Biologist , Rugi.Jalloh@dfo-mpo.gc.ca
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada

RE: Northern Pulp Marine Geotechnical Pipeline Investigation

To All,

We would like to submit technical details of our upcoming Geotechnical Program to your organizations in order that you are aware of our activities. It is our understanding that formal permits are not required for these studies, however, we are happy to provide you with whatever information you require to understand our activities.

Enclosed please find technical details for the above noted upcoming geotechnical sampling project. Rather than use an intrusive drilling rig with barge and tugboat, CSR plans to use a 5m long Vibrocore to collect the required sediment cores.

Specific questions are answered below with supporting data appended.

QUESTIONS

- Type of rig:
- Size/type of boat: Cape Islander 40'. It must anchor but no stabilizer/spuds are required that would impact the harbour bottom (see attached)
- # of holes to be advanced:
- Locations /areas of drilling: See Attached 10km Route (samples at 400m intervals)
- Managing navigability : Notice to Mariners will be notified
- Dates to complete work: Proposed by end of April 2018
- Approx. duration of work: Nominally, 1 week

CSR GeoSurveys Ltd. (CSR) is an internationally recognized geophysical consulting company that specializes in high resolution marine geophysical and hydrographic surveys. We are currently in

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our 32nd year in business.

Please do not hesitate to call should you have any questions.

Sincerely,

Glen Gilbert, P.Geo.
President

In my absence please contact:
Patrick Campbell, P.Geo.
Vice President

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1.0 INTRODUCTION

Paper Excellence Canada is planning to replace the existing effluent treatment system at the Northern Pulp mill on Abercrombie Point, NS. (see Figure 1) The system will be replaced with a new wastewater treatment plant, including a new marine effluent outfall. To carry out this project, a marine geotechnical and harbour bottom video investigation of the proposed route for the new submerged effluent outfall within Pictou Harbour and the Northumberland Strait is required.

CSR GeoSurveys Ltd (CSR) in association with Stantec Consulting Ltd. (Stantec) is pleased to provide the following scope of work in support of our response to this RFQ. This response covers our proposed approach to address the geotechnical pipeline engineering.

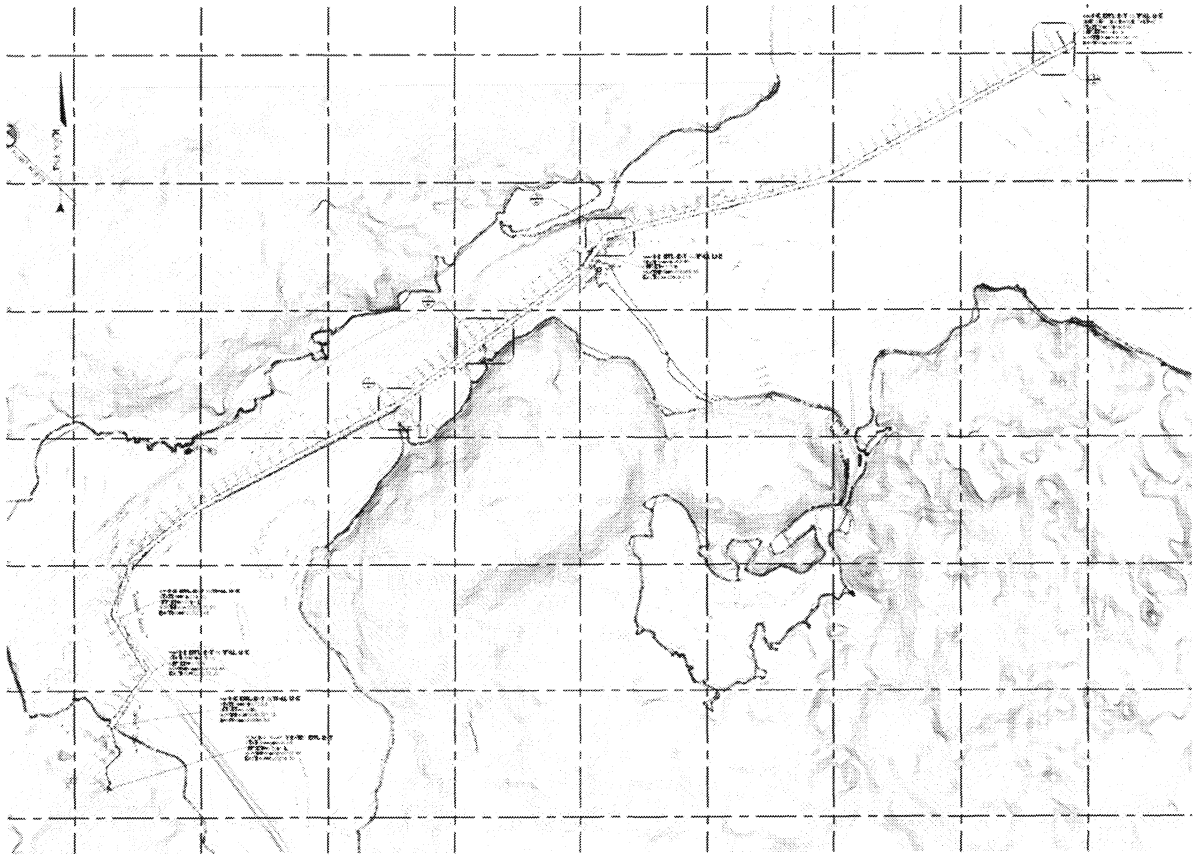


Figure 1, Proposed Pipeline Route

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2.0 Geotechnical Program To Confirm Soils

A Geotechnical program can now take place along the preferred pipeline route. It is the CSR-Stantec's team opinion that will be sufficient for pipeline design.

A 40' Cape Island style survey boat with a large A-frame will be used to collect the vibrocores. CSR has used this vessel and crew on previous jobs and she has proved to be a very good sea boat which should enhance production over anchored barge drilling.

3.0 Health, Safety & Environmental

CSR has a long term commitment to safety on the job site and has not had any lost time due to accidents in 30+ years. CSR has an offshore safety manual that each of its employees must become familiar with, in addition to taking safety courses and on the job training. All CSR personnel are trained in Basic Offshore Survival MED-A1 or higher, marine first aid, and WHIMS. CSR has the lowest workers compensation experience rating for its industry.

CSR is a COR certified member of the Nova Scotia Construction Safety Association. The Construction Safety Nova Scotia's Certificate of Recognition (COR) program is the most widely accepted standard for safety certification in Atlantic Canada.

CSR has been a member of ISNetworld since 2014. ISNetworld collects and maintains self-reported contractor information such as insurance documents, safety programs and incident rates. ISN's Review and Verification Services team reviews contractors' information against regulatory and client requirements. ISNetworld helps connect safe, qualified contractors and suppliers with Clients around the globe, facilitating partnerships to help ensure safer job sites.

CSR has worked in many environmentally sensitive areas. We are responsible practitioners of terrestrial and marine environments.

CSR will initiate a pro-active safety plan for this project upon contract award to ensure the requirements of this job are met within safe working guidelines. The CSR team is well versed with safety requirements through training and operational experience. Good communication will be encouraged as often this can pro-actively deal with problems before they occur.

Upon contract award, CSR will develop comprehensive HSE plan. This plan will be completed and submitted for review in advance of the commencement of the field work. Field work will not begin until the HSE plan has been approved by the Client.

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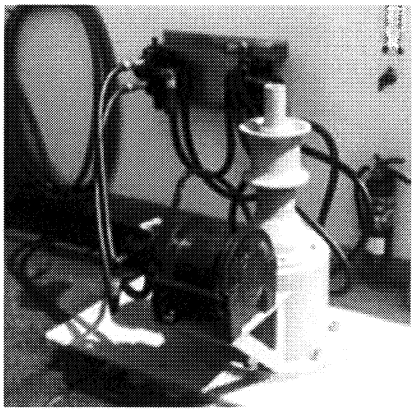
4.0 SURVEY EQUIPMENT

4.2 GEOTECHNICAL PROGRAM

4.2.1 NOVA ENDEAVOR

CSR will subcontract Huntley's Sub-Aqua Construction of Kentville to provide a fully crewed survey vessel to assist with the





LOA	42'
BEAM	16'
POWER	6 cylinder Mitsubishi 507 twin disc drive
HYDRAULICS	24 gpm hydraulic pump
ELECTRONICS	2 -radar,2gps, sounder, auto pilot
NAVIGATION	Laptop plotter
SAFETY	Life raft capacity for 10 people
DIVING	Dive Control/ survey control station(room)
REGISTRATION	Vessel is "Blue Sticker" certified for safety from Transport Canada
A-FRAME	Rated for 5,000 lbs. The A frame articulates forward approximately 4ft. Height is approximately 14' above deck.
DECK	Fibreglas with wood stringers underneath for winch mounting

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4.1.2 NAVIGATION SYSTEM

[redacted]

Receiver

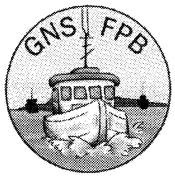
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GULF NOVA SCOTIA FLEET PLANNING BOARD
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The Honourable Catherine McKenna
Minister of Environment and Climate Change
House of Commons
Ottawa, Ontario K1A 0A6

Canadian Environmental Assessment Agency National Office
22nd Floor, Place Bell
160 Elgin St.
Ottawa, Ontario K1A 0H3

Canadian Environmental Assessment Agency Nova Scotia Regional Office
1801 Hollis St. Suite 200
Halifax, Nova Scotia B3J 3N4

April 11, 2018

RE: Request for Federal Environmental Assessment of Northern Pulp Nova Scotia Corporation's Effluent Pipe Project

Dear Ms. McKenna:

1. Request for Federal Environment Assessment under Section 14 of CEAA 2012

[1] We the undersigned are writing to formally request that you, as Minister of Environment and Climate Change, designate Northern Pulp Nova Scotia Corporation's proposed pulp mill effluent treatment project at Abercrombie Point, Nova Scotia, as one that requires a federal environmental assessment under the *Canadian Environmental Assessment Act 2012*. The proposed new effluent treatment facility includes a ten-kilometre pipe to discharge effluent from a bleached kraft pulp mill into the Northumberland Strait.

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[2] We make this request given that you have legislative authority under subsection 14(2) of the Act to designate a project for a federal environmental assessment, notwithstanding that the project is not identified in the *Regulations Designating Physical Activities* (Project List) under the Act. We are confident that Northern Pulp's effluent treatment project falls under the authority of the Canadian Environmental Assessment Agency.

[3] We note that, per subsection 14(5) of the Act, Northern Pulp has not yet begun the physical carrying out of the project, and we understand that no federal authority has exercised a power that would permit Northern Pulp to carry out the project. Thus, we suggest that the subsection 14(5) limitation does not apply to this matter.

[4] Subsection 14(2) of the Act states, in part, that you may order a federal environmental assessment for a project if, in your opinion, (a) the project "may cause adverse environmental effects" or if (b) "public concerns related to those effects may warrant the designation." We urge you to consider the following information regarding these criteria. We are confident that Northern Pulp's effluent treatment project may cause severe adverse environmental effects and that the abundance of public concern over this project warrants federal review of the project.

[5] Furthermore, as explained below, we are confident that the anticipated negative impacts of the effluent project touch on several areas of federal legislative authority, namely: fish and fish habitat; aquatic species under the *Species at Risk Act*; changes on federal lands (ocean and sea floor beyond the jurisdiction of Nova Scotia); changes that impact a province other than where the project is proposed (Prince Edward Island and New Brunswick); and impacts to the aboriginal rights of Pictou Landing First Nation.

2. Significant Adverse Environmental Effects of the Project

2.1 Harm to Fish, per section 2(1) of the Fisheries Act

[6] Northern Pulp's proposed effluent treatment project will pipe 70-90 million litres of toxic pulp mill effluent per day from the pulp mill into the Northumberland Strait. These toxins may include dioxins, furans and heavy metals such as mercury, zinc, cadmium and chromium, along with oxygen-depleting nutrients. The toxins present in the effluent (and the bio-accumulation of these toxins) pose a danger to the fish, shellfish, crustaceans (including lobster), and other marine animals that inhabit this highly productive marine ecoregion. Furthermore the toxins may have a negative impact on the eggs, sperm, larvae, spat, juvenile and adult states of these organisms. In addition to the toxins present in the effluent, the pipe will deliver a vast amount of fresh, warm water into the Strait, which will potentially kill eggs and larvae from numerous species, lobster included, that pass within the zone of concentrated freshwater. Finally, the temperature of the effluent may further negatively impact

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marine life. The Strait is known for its prolific shellfish and lobster populations and these are threatened by the effluent pipe project.

[7] Construction associated with laying ten-kilometres of pipe, including dredging, laying a rock mattress, laying pipe, and installing armour rock, will inevitably damage fish habitat.

[8] We are concerned that the pipe, over time, will inevitably leak and leaks will be extremely difficult to fix if (when) they occur during winter months when ice build-up makes accesses to the pipe impossible.

[9] The accumulation of toxins and nutrients from the effluent may also create a zone of contamination and a zone of eutrophication within the Northumberland Strait, which would effectively destroy a portion of the Northumberland Strait's fish habitat.

2.2 Cumulative Impacts on the Northumberland Strait's Marine Environment

[10] According to a study conducted by AMEC Earth & Environmental for the Department of Fisheries and Oceans (DFO), there are already dead zone areas in the Northumberland Strait that lack oxygen due to excessive nutrient inputs. The pipe will contribute to reduced oxygen levels in the Strait; even if reduced oxygen levels do not outright kill fish, they can cause sub-lethal effects such as reduced growth and reproduction.

[11] We are extremely concerned with the cumulative impact that the effluent treatment project will have on the Strait's fish habitat. The Northumberland Strait is already a fragile marine environment; the pipe cannot be considered in isolation from the other threats already impacting fish habitat in the Strait, such as eutrophic conditions, reduced oxygen, increased global warming, etc. The pipe could be the 'tipping point' that triggers ecosystem collapse within the Strait.

2.3 Impact on Marine Species at Risk

[12] The effluent treatment project may impact species at risk that inhabit or frequent the Northumberland Strait. The following marine species, found within the Strait, have been identified as at risk or of special concern by COSEWIC (not all are yet designated under the *Species at Risk Act*): Acadian Redfish, Atlantic population (*Sebastes fasciatus*); Deepwater Redfish (Gulf of St. Lawrence population) *Sebastes mentella*; American Plaice (*Hippoglossoides platessoides*); Atlantic Cod, Laurentian South population (*Gadus morhua*; Atlantic Sturgeon, Maritimes Population (*Acipenser oxyrinchus*); Harbour Porpoise (Northwest Atlantic population) (*Phocoena phocoena*); Striped Bass, Southern Gulf of St. Lawrence population (*Morone saxatilis*); White Hake, Southern Gulf of St. Lawrence population (*Urophycis tenuis*); Leatherback Sea Turtles,

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Atlantic population (*Dermochelys coriacea*); North Atlantic Right Whale (*Eubalaena glacialis*).

2.4 Impact on Air Quality

[13] We are concerned that the proposed effluent treatment system will increase air pollution through the burning of contaminated sludge. Northern Pulp has repeatedly violated their allowed levels of air pollution, and the proposed treatment system may increase the amount of pollutants released into the air, thereby increasing health concerns for local residents.

3. Significant Public Concern Related to the Adverse Environmental Effects of the Project

[14] We, the undersigned, directly represent approximately 3,600 people from Nova Scotia, Prince Edward Island and New Brunswick, including members of the Prince Edward Island Fishermen's Association, the Maritime Fishermen's Union, the Gulf Nova Scotia Fleet Planning Board, and the Pictou Landing First Nation. The people we represent have made it abundantly clear to us that they are deeply concerned that the adverse environmental impacts of the effluent treatment project will directly impact their livelihoods, their quality of life, and their inherent right to live in a healthy environment.

[15] Beyond the people we directly represent, citizens of Nova Scotia, New Brunswick and Prince Edward Island have voiced their concerns with the environmental impacts of the proposed effluent treatment project. The Premier of Prince Edward Island, Wade MacLauchlan, for example, has publicly voiced his concern that the effluent pipe project may adversely affect the commercial fishing industry. Premier MacLauchlan stated (in a letter to you) that "an effluent pipe that would allow as much as 75,000 cubic metres of fresh warm water to be directed daily into the Northumberland Strait is not a project that our government will support as proposed." Premier MacLauchlan also referred in his letter to the unique tidal and water circulation patterns present in the Strait. The Premier concluded that,

> *"we all agree that any development that risks the habitat and reproductive cycle of species such as lobster - or that threatens the livelihood of thousands of families dependent on the fisheries in the Northumberland Strait - cannot proceed."*

[16] We have received letters from citizens who are deeply concerned with the potential impact of the proposed effluent treatment system on recreational fisheries in the Northumberland Strait, particularly impacts from increased water temperature and toxic chemicals. Of particular concern is the potential impact on Atlantic Salmon within the Strait.

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[17] Numerous letters to the editor from concerned citizens have been published by local newspapers and the provincial Chronicle Herald paper. A few examples of these letters can be found at the following links:

- https://www.ngnews.ca/opinion/letter-to-the-editor/letter-need-thorough-unbiased-environmental-study-173041/
- http://thechronicleherald.ca/letters/1538435-letter-of-the-week-trashing-my-place-of-business
- http://pictouadvocate.com/2018/01/12/politicians-insist-mill-clean-act/

[18] Some 7,000 citizens are following and engaging in social media platforms created specifically to share information with concerned citizens. Following are several examples:

- https://www.facebook.com/groups/545965902107532/?ref=br_rs
-https://www.facebook.com/search/top/?q=gulf%20of%20st%20lawrence%20fishers%20and%20community%20against%20pollution
- https://www.facebook.com/friendsofthenorthumberland/

[19] Several citizens' events have been held in Nova Scotia, including a panel discussion on the proposed project hosted by Solidarity Halifax and attended by some 150 people. Speakers included author Joan Baxter, members of the Pictou Landing First Nation, and Northumberland fishermen. As well, fishermen, their families, and concerned citizens joined the 'Rise Up Rally' on the steps of the Nova Scotia Legislature to protest the project and demand that our fisheries be protected.

[20] The Tourism Industry Association of Nova Scotia recently wrote to Premier McNeil to ask for a more rigorous assessment process of the proposed project in order to instill public confidence in the decision-making process and to ensure that other business sectors' interests are protected.

[21] A citizens group known as Friends of the Northumberland Strait has been created to oppose the proposed project, and (a) has presented their concerns about the project to four local municipal councils; (b) has set up nearly 1,000 "No Pulp Waste in Our Water" signs throughout Pictou County, Halifax Regional Municipality and Prince Edward Island; (c) has written to Nova Scotia's Environment Minister to challenge his assertion that effluent has been discharged into the Strait for fifty years; presented at a public information session on January 27th to over 60 local community members in Pictou, NS; (d) will host a public open house on April 14th to help inform citizens about the proposed project; (e) has created on-line platforms to share facts, science and opinions on the proposed project and its consequences on the economy, the environment, and the health and quality of life of citizens throughout the region (https://www.friendsofthenorthumberlandstrait.ca/); and (f) has created the #NOPIPE trend which is spreading widely through social media.

[22] The citizens groups Save our Seas and Shores Prince Edward Island, the Prince Edward Island Council of Canadians, the University of Prince Edward Island

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Environmental Society, the McCillop Centre for Social Justice and the Sierra Club Atlantic will be co-hosting an information open house on April 8th, with Joan Baxter and Melanie Giffin presenting.

[23] The Town of Pictou and the Municipality of the County of Pictou have passed resolutions expressing their citizens' concerns about the proposed project.

[24] There has been extensive media coverage of the proposed project and the concerns of citizens (https://docs.wixstatic.com/ugd/b61814_4df46ccd4a6f406784b3997464d59a5a.pdf).

[25] During a Standing Committee session in the Prince Edward Island Legislature on the proposed project, there was standing room only and citizens had to be routed into an overflow room in another building with the proceedings live-streamed to them.

[26] The Assembly of Nova Scotia Mi'kmaq Chiefs, which represents over 22,000 Mi'kmaq in Nova Scotia, has written (to you) in support of a Federal environmental assessment.

4. Provincial Environmental Assessment alone not Adequate

[27] You are likely aware that the province of Nova Scotia will be undertaking an environmental assessment of Northern Pulp's effluent pipe project. Under Nova Scotia's *Environmental Act*, the province has two levels of environmental assessment, Class 1 and Class 2. The province has decided to undertake the less rigorous Class 1 assessment, which would last a maximum of fifty days and allow a mere thirty days for public comment on the project. We strongly believe that the province's Class 1 environmental assessment of Northern Pulp's effluent pipe is woefully inadequate to deal with the potential adverse impacts on Northumberland Strait marine environment and the level of public concern with these adverse impacts.

[28] Without a doubt, there is a critical need for a federal environmental assessment to ensure adequate investigation and mitigation of the potential adverse effects of the effluent pipe project, and to allay public concerns regarding these adverse effects. Anything less will not be acceptable to the fishermen's organizations, Pictou Landing First Nation, and general public in Nova Scotia, Prince Edward Island and New Brunswick.

5. Existing Regulatory Mechanisms not Sufficient

[29] We recognize that Northern Pulp may be required to meet generic regulations regarding pulp mill effluents. Nonetheless, the unique ecological and hydrographical circumstances of the Northumberland Strait require a federal environmental assessment in order to ensure that potential adverse impacts are known for this

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specific location and these circumstances, and measures are taken to mitigate the specific potential impacts of the effluent pipe.

6. Standard Design Features and Mitigation not Applicable

[30] Given that the effluent pipe project proposed by Northern Pulp has no equivalent in the Northumberland Strait, there are no known design features or mitigation methods that could be relied on in advance of the project going forward. A federal environmental assessment is necessary to determine the extent of potential adverse environmental effects of the effluent pipe project and to determine acceptable mitigation options.

7. Impacts to the Pictou Landing First Nation's Aboriginal Rights

[31] Pictou Landing First Nation's main industry is fishing, including lobster, and Chief Andrea Paul has strongly stated her and her Nation's concerns with the potential adverse effects of the effluent treatment project on her community and its fishing industry. The Pictou Landing First Nation asserts its traditional aboriginal right to fish in the Northumberland Strait, and is deeply concerned that the Northern Pulp effluent treatment project will negatively impact this right.

8. Project may Change Components of the Environment within Federal Legislative Authority

[32] As stated above, Northern Pulp's effluent treatment project may cause adverse impacts (a) to fish and fish habitat as defied in subsection 2(1) of the *Fisheries Act*; and (b) to aquatic species as defined in subsection 2(1) of the *Species at Rick Act*.

[33] Furthermore, the effluent treatment project may cause impacts that radiate onto federal land (ocean floor and water beyond provincial jurisdiction), and the impacts of the project may affect provinces other than Nova Scotia, specifically Prince Edward Island and New Brunswick (per subsection 5(1)(b) of CEAA 2012).

[34] We note, as well, that the effluent treatment project will impact a federal Marine Refuge area, namely the Scallop Buffer Zone (SFA 24) created in the Northumberland Strait to protect juvenile lobster habitat. This Marine Refuge counts towards the 10% target to protect Canadian coastal and marine areas before 2020.

[35] Finally, as noted above, the effluent treatment project's anticipated changes to the environment may affect the Pictou Landing First Nation's (a) health conditions via consumption of contaminated marine species; (b) socio-economic conditions due to adverse impacts on the Nation's lobster fishers, whether through reduction in catches and/or through damage to lobster markets caused by negative publicity of the effluent pipe; and (c) current use of the marine environment as a traditional food source and

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to obtain a moderate livelihood, via contamination and deterioration of the Strait's marine ecological health (per subsection 5(1)(c) of CEAA 2012).

9. Concern with Perceived Potential Bias of Provincial EA Decision-Maker

[35] We are concerned that the province of Nova Scotia may be, or may be perceived to be, biased with respect to its relationship with Northern Pulp and thereby unable to undertake an unbiased decision-making process with respect to the proposed effluent treatment system. The following are some of our specific concerns:

- the Nova Scotia Minister of Transportation and Infrastructure Renewal stated recently that the Province will be contributing to the costs of the new effluent treatment system, that is, the very system that the Province will be reviewing through the Environmental Assessment process; the Province has already paid $300,000 towards the design cost of the proposed treatment project;

- the Province is party to an extremely generous indemnity agreement signed with Northern Pulp's predecessor Scott Paper covering the current effluent treatment system; given that the Province may be legally responsible to fully reimburse Northern Pulp for any legal action against Northern Pulp (including charges for breaches of any environmental laws, and including any costs related to loss of profit) related to the current effluent treatment system, there may be an incentive for the Province to approve a new effluent treatment system in order to rid itself of the onerous conditions of the indemnity agreement;

- the Province has invested $117 million in Northern Pulp in recent years; given this level of financial investment, is it difficult to see how the Province can now act as an impartial decision-maker; Northern Pulp repeatedly claims that it will shut down if the pipeline is not approved as proposed, thereby exerting extreme pressure on the Province to approve the treatment system as proposed;

- should Northern Pulp shut down (temporarily or permanently) due to a delay or required modification of the new effluent treatment process, the Province may be legally responsible for the ensuing financial losses suffered by Northern Pulp because of the indemnity agreement; and

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- we have received letters from the Minister of Nova Scotia Environment (Mr. Iain Rankin) assuring us that the environmental impacts of the proposed effluent treatment system will be minimal; given that the Province has yet to conduct an Environmental Assessment, this is an extremely troubling indicator that the Province cannot be considered an unbiased decision-maker in this matter.

Sincerely,

Robert H. Jenkins
Prince Edward Island Fishermen's Association, President

Maruti Mallet (for Carl Allen), Executive Director
Carl Allen
Maritime Fishermen's Union, President

Ronnie Heighton
Gulf Nova Scotia Fleet Planning Board, President

Andrea Paul
Pictou Landing First Nation, Chief

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Cc: Mr. Sean Fraser, M.P.
Central Nova

Mr. Rodger Cuzner, M.P.
Cape Breton-Canso

Mr. Bill Casey, M.P.
Cumberland-Colchester

Honourable Mr. Dominic LeBlanc, P.C. M.P.
Minister of Fisheries, Oceans and the Canadian Coast Guard

Mr. Jonathan Wilkinson, M.P.
Parliamentary Secretary to the Minister of Environment and Climate Change

Mr. Lawrence MacAulay, M.P.
Mr. Sean Casey, M.P.

Mr. Wayne Easter, M.P.

Mr. Robert Morrissey, M.P.

Prince Edward Island Premier Wade MacLauchlan

s.19(1)

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Canadian Environmental Assessment Agency
Agence canadienne d'évaluation environnementale

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April 26, 2018

Mr. Robert H. Jenkins
President, PEI's Fishermen's Association

Mr. Carl Allen, President
Maritime Fisherman's Union

Mr. Ronald Heighton
President, Gulf Nova Scotia Fleet Planning Board

Chief Andrea Paul
Pictou Landing First Nation

c/o Leonard LeBlanc
Managing Director and Secretary Treasurer, Gulf Nova Scotia Fleet Planning Board

Dear Robert Jenkins, Carl Allen, Ronald Heighton, and Chief Andrea Paul:

Thank you for the additional information in your letter dated April 11, 2018 detailing your concerns around the Northern Pulp Effluent Treatment Facility Replacement Project (the Project) and your request that the Project be subject to a federal environmental assessment due to potential environmental and socio-economic impacts caused by the Project.

As you are aware, the Canadian Environmental Assessment Agency (the Agency) is currently assessing the applicability of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) to the Project and will reflect the input received from government departments, Indigenous groups, and stakeholders in its advice to the Minister of Environment and Climate Change Canada.

Further questions regarding the Project and this analysis can be directed to Ms. Melanie Smith, Team Leader, at 902-426-6623 or by email at ceaa.northernpulp.acee@ceaa-acee.gc.ca.

Yours Sincerely,

Mike Atkinson
Regional Director, Atlantic Region

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Smith, Colleen A

From: Cortese, Lana
Sent: April-30-18 4:53 PM
To: Smith, Colleen A
Subject: RE: Question about CEAA - projects on federal lands

Hi Colleen,

If you are reviewing the project soon, it would fall under CEAA 2012, as the IA Act will not enter into force until summer 2019. The IA Act requires a slightly different scope of assessment for projects on federal lands than CEAA 2012, as per my previous e-mail which highlights the scope of what is required under the new IA Act.

Under CEAA 2012, you would be required to evaluate the potential for the project on federal lands to cause significant adverse environmental effects, as defined in s.5(1) of CEAA 2012 prior to the project being carried out. If a Fisheries Act Authorization is required, then the environmental effects outlined in s.5(2) of CEAA 2012 need to be assessed as well.

Environmental effects

For the purposes of this Act, the environmental effects that are to be taken into account in relation to an act or thing, a physical activity, a designated project or a project are

(a) a change that may be caused to the following components of the environment that are within the legislative authority of Parliament:

(i) fish and fish habitat as defined in subsection 2(1) of the *Fisheries Act*,

(ii) aquatic species as defined in subsection 2(1) of the *Species at Risk Act*,

(iii) migratory birds as defined in subsection 2(1) of the *Migratory Birds Convention Act, 1994*, and

(iv) any other component of the environment that is set out in Schedule 2;

(b) a change that may be caused to the environment that would occur

(i) on federal lands,

(ii) in a province other than the one in which the act or thing is done or where the physical activity, the designated project or the project is being carried out, or

(iii) outside Canada; and

(c) with respect to aboriginal peoples, an effect occurring in Canada of any change that may be caused to the environment on

(i) health and socio-economic conditions,

(ii) physical and cultural heritage,

(iii) the current use of lands and resources for traditional purposes, or

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

Exercise of power or performance of duty or function by federal authority

(2) However, if the carrying out of the physical activity, the designated project or the project requires a federal authority to exercise a power or perform a duty or function conferred on it under any Act of Parliament other than this Act, the following environmental effects are also

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to be taken into account:
(a) a change, other than those referred to in paragraphs (1)(a) and (b), that may be caused to the environment and that is directly linked or necessarily incidental to a federal authority's exercise of a power or performance of a duty or function that would permit the carrying out, in whole or in part, of the physical activity, the designated project or the project; and
(b) an effect, other than those referred to in paragraph (1)(c), of any change referred to in paragraph (a) on
(i) health and socio-economic conditions,
(ii) physical and cultural heritage, or
(iii) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance.

It's important to note that if a Fisheries Act Authorization is required for the project to proceed, under CEAA 2012 both s. 5(1) AND s.5(2) environmental effects would need to be evaluated – so in this sense there is a difference in terms of the type of effects that needs to be considered if you are issuing a Fisheries Act Authorization. There is no specific guidance regarding *spatial* scoping of environmental effects in CEAA 2012 or the IA Act – spatial scoping decisions are made by the EA practitioner(s) (based on the definitions of effects that need to be assessed from the Act) working on the particular project context/design.

Feel free to give me a call if you would like to discuss further.

Thanks,

Lana

From: Smith, Colleen A
Sent: April-30-18 1:04 PM
To: Cortese, Lana
Subject: RE: Question about CEAA - projects on federal lands

Hi Lana,

I am asking in relation to Northern Pulp and Paper, effluent discharge pipe. This is an active file for our region and we will soon need to make a determination about the requirement for a Fisheries Act authorization. If we decide an authorization is required then we will be a Federal Authority under CEAA 2012, as the proposed pipe goes through a federal harbour. I guess my question is how far would we scope environmental effects? Just the impacts on federal lands or impacts beyond the boundaries of the federal harbour?

And, will this scoping decision be the same with the proposed changes to CEAA?

I don't know if that helps or not? I appreciate your advice.

Thanks,
Colleen

From: Cortese, Lana
Sent: April-30-18 10:51 AM
To: Smith, Colleen A
Subject: RE: Question about CEAA - projects on federal lands

Hi Colleen,

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Thanks for following-up. Your question is related to the scope of impacts that are considered in an environmental assessment. The IA Act does now include more guidance than CEAA 2012 in terms of what environmental assessments of projects on federal lands need to consider- this additional guidance is provided by the definition of environmental effects and the definition of a project (s.81) and the factors that need to be considered (s.84). However, scoping decisions are always based on the circumstances and design details particular project, so without more information on the project it isn't really possible to provide generalized guidance on what would need to be considered, aside from what the Act provides (see below). Section 82 prohibits authorities from carrying on projects on federal land and from doing anything that could enable the project to be carried out (including providing funding) until an assessment of effects was completed, so the first step in answering your question would be to determine what action the authority managing the federal land was required to take for the project to be completed.

environmental effects means changes to the environment and the impact of these changes on the Indigenous peoples of Canada and on health, social or economic conditions. (*effets environnementaux*)

project means
(a) a physical activity that is carried out on federal lands or outside Canada in relation to a physical work and that is not a designated project; and
(b) a physical activity that is designated under section or that is part of a class of physical activities that is designated under that section.

Factors
84 An authority's determination regarding whether the carrying out of the project is likely to cause significant adverse environmental effects must include a consideration of the following factors:
(a) any adverse impact that the project may have on the rights of the Indigenous peoples of Canada recognized and affirmed by section 35 of the *Constitution Act, 1982*;
(b) traditional knowledge of the Indigenous peoples of Canada provided with respect to the project;
(c) community knowledge provided with respect to the project;
(d) comments received from the public under subsection 86(1); and
(e) the mitigation measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project that the authority is satisfied will be implemented.

Hope this helps,

Lana

From: Smith, Colleen A
Sent: April-27-18 1:29 PM
To: Cortese, Lana
Subject: Question about CEAA - projects on federal lands

Hi Lana,

I just participated in the teleconference from the Maritimes Region. I thought of a question that I did not get an opportunity to ask. What if there is a project that goes through federal lands (port authority land), do you only

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determine the impacts of the project on the federal lands portion of the project or would you consider impacts beyond that of the federal lands? For example a pipeline that goes through federal lands (port) but starts on private property then beyond onto one or more provincial jurisdictions?

Thanks,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosytem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

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Smith, Colleen A

From: Smith, Colleen A
Sent: May-09-18 11:58 AM
To: NorthernPulp [CEAA|ACEE]
Cc: Jalloh, Rugi; Wambolt, Michael
Subject: RE: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation
Attachments: Request for Designation - Request for Information from FRT_DFO.PDF
Attachment provided elsewhere.
Importance: High

Hello Lachlan,

Thank you for providing Fisheries and Oceans Canada with this updated information. Upon review of the information, our original response, see attached, provided to you on March 9, 2018 remains unchanged. We are still awaiting the information that has been requested through our regulatory review process so that we may determine if a Fisheries Act Authorization will be required.

Best Regards,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: NorthernPulp [CEAA|ACEE] [mailto:CEAA.NorthernPulp.ACEE@ceaa-acee.gc.ca]
Sent: April-23-18 12:00 PM
To: Denning, Allison (HC/SC) (allison.denning@canada.ca); Campbell, Deborah (NRCAN/RNCAN) (deborah.campbell@canada.ca); Flanagan, Jason: TC; Hingston,Michael [Dartmouth]; Smith, Colleen A; RCF Surveiller / FCR Tracker (EC)
Cc: Smith,Melanie [CEAA/ACEE]
Subject: RE: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation

Hi Team,

The Agency has received additional information from the project proponent and I am making this information available to the expert federal departments to determine if this information will changes your original response.

You can access the new information by logging into the Collaboration site and searching for "Northern Pulp Replacement ETF" workspace. The two far-field modelling videos may be too compressed to work. If this is something you need and can't get to run then let me know and I will send you a cd with the models on it.

The Agency requests your response to the questions provided in the attachment no later than **May 14, 2018**.

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Thanks,
Lauchie

From: Howse Mine / Mine Howse (CEAA/ACEE)
Sent: February 27, 2018 2:14 PM
To: Denning, Allison (HC/SC) (allison.denning@canada.ca); Troke, Glenn (EC) (glenn.troke@canada.ca); Johnson, Roger: DFO; Campbell, Deborah (NRCAN/RNCAN) (deborah.campbell@canada.ca); jason.flanagan@tc.gc.ca; Keeping, Brent (BrentKeeping2@gov.nl.ca)
Cc: Smith,Melanie [CEAA/ACEE]; Atkinson,Mike [CEAA]
Subject: Northern Pulp Replacement Effluent Treatment Facility Project - Request for Designation

Hi Team,

The Agency has received a request from a member of the public to designate the Northern Pulp Replacement Effluent Project (the Project) for a federal environmental assessment under subsection 14(2) of CEAA 2012. When such requests are received, the Agency advises and assists the Minister of Environment and Climate Change Canada on the use of her authority to require an environmental assessment of a project not identified in the Regulations pursuant to CEAA 2012.

As part of our analysis of the Project, the Agency is seeking advice from expert federal departments on the Project's potential environmental effects in areas of federal jurisdiction. All available information can be found on the project website for your review and reference: https://sites.google.com/dillon.ca/northernpulpetf/home. No provincial registration document is expected until later in the spring or early summer.

The Agency requests your response to the questions provided in the attachment no later than **March 19, 2018**.

Thanks,
Lauchie

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
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Government of Canada Gouvernement du Canada

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Smith, Colleen A

From: Smith, Colleen A
Sent: May-14-18 2:46 PM
To: Maclean,Lachlan [CEAA]; Hingston,Michael [Dartmouth]; Flanagan, Jason: TC
Cc: Denning, Allison (HC/SC); Michael.wambolt@dfo-mpo-gc.ca
Subject: RE: Northern Pulp futher information

Hi Lauchie,

As you are aware DFO is awaiting information from the proponent so that we can determine if a Section 35(2) Fisheries Act Authorization is required. Until this decision is made we cannot determine DFO's role/involvement under Section 67 of CEAA 2012. Mike Wambolt and myself can participate in the teleconference. Can you send us the call in information?

Thank you,
Colleen
Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Maclean,Lachlan [CEAA] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: May-11-18 3:57 PM
To: Hingston,Michael [Dartmouth]; Smith, Colleen A; Flanagan, Jason: TC
Cc: Denning, Allison (HC/SC)
Subject: Northern Pulp futher information

Hi FRT Team!

The Agency is meeting with the Pictou Landing First Nation Chief Andrea Paul on Wednesday May 16 to discuss the Northern Pulp Replacement Effluent Treatment Facility. We are hoping our federal partners can provide us with a couple of things for next week:

1. Whether your department will need to conduct an assessment under Section 67 of CEAA 2012 (if you have enough info to determine yet);
2. Your Department's Section 67 process and scope of factors you consider when doing a Section 67;
3. If you could have somebody on call Wednesday from 10 until 12 in case a question comes up that we need an answer (e.g. your role in the Project under Section 67, your consultation process, etc.). **Allison, I'd need you for this too**.

Could you let me know if this is possible?

Thanks and have a great weekend. Please call me on Monday if you have any questions regarding my requests.

Lauchie

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Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

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Smith, Colleen A

From: Burgess, Annamarie <aburgess@dillon.ca>
Sent: May-17-18 12:31 PM
To: Smith, Colleen A
Cc: Jalloh, Rugi; Wambolt, Michael; Sarah Devereaux; March, Karen; Fraser, Terri; Mike Wilson; Kathy Cloutier; 176461
Subject: Re: NPNS: Update on Marine Geotechnical and Harbour Bottom Survey

Follow Up Flag: Follow up
Flag Status: Completed

Good afternoon Colleen,
Additional sidescan sonar was completed and data was processed end of last week. To ensure appropriate coverage and maximize the efficiency of the geotech program, the design engineer is reviewing the sonar results for any influence on the pipe route. With the known proximity of the proposed route to the navigational channel we may speak with Transport Canada to confirm our approach before proceeding with geotech. I will advise when we expect to have the boat in the water in the next little while.
Regards,
Annamarie

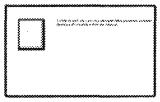
Annamarie Burgess
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca

Please consider the environment before printing this email

On Tue, May 1, 2018 at 4:59 PM, Burgess, Annamarie <aburgess@dillon.ca> wrote:
Good afternoon Colleen,
Updates for this week:
NPNS's geotech provider CSR are still looking at getting a vessel capable of doing the geotech. One has been identified, however, is expected to be a week or two in transit.
NPNS is taking the time to get additional input from the pipeline designer to confirm locations of the geotechnical program, and refining the routing with available information now in hand. Also completing supplementary sidescan sonar for the route refinement (e.g. additional coverage area to map avoiding an identified collapsed wharf around the small craft harbour).

Regards,
Annamarie

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Annamarie Burgess
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M - [redacted]
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www.dillon.ca

Please consider the environment before printing this email

On Wed, Apr 25, 2018 at 3:56 PM, Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca> wrote:

Hi Annamarie,

Thank you for continuing to update us as work progresses on this project.

Kind regards,

Colleen

Colleen Smith, BSc.

Senior Fisheries Protection Biologist, Fisheries Protection Program

Ecosytem Management

Fisheries and Oceans Canada

1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2

Tel. 902-293-7834

Colleen.smith@dfo-mpo.gc.ca

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: April-25-18 3:44 PM
To: Smith, Colleen A
Cc: Jalloh, Rugi; Wambolt, Michael; Sarah Devereaux; March, Karen; Fraser, Terri; Mike Wilson; Kathy Cloutier; 176461
Subject: Re: NPNS: Update on Marine Geotechnical and Harbour Bottom Survey

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Good afternoon Colleen,

As discussed, I am providing DFO with a 'weekly update' on the progress of the marine investigations.

The sidescan sonar continued last week with some delays due to the poor weather conditions.

Visibility for the video camera has been 'poor' (about 1 m) in the harbour and has also given a little delay accordingly.

A significant delay has been encountered for the geotechnical program. A rental ship (typically leased by the geotechnical service provider) had been arranged. However, the owner of the ship backed out yesterday upon learning that it was going to be work for Northern Pulp. A search for an alternative ship is underway, however, options appear limited. Modifications to a boat may be required in order for the work to be completed.

The investigations as a whole are therefore are not expected to be complete by April 30. While the work itself poses very low risk to fish and fish habitat, we had hoped to avoid additional boating and fishing activity with the commencement of lobster season.

We appreciate DFO's interest and ongoing feedback on the project.

I will continue to provide weekly updates, and hope next week to have some more definitive information on the geotechnical program.

Regards,

Annamarie

Annamarie Burgess
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]

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F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca
Please consider the environment before printing this email

On Mon, Apr 16, 2018 at 3:38 PM, Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca> wrote:

Thank you Annmarie.

Colleen

Colleen Smith, BSc.

Senior Fisheries Protection Biologist, Fisheries Protection Program

Ecosytem Management

Fisheries and Oceans Canada

1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2

Tel. 902-293-7834

Colleen.smith@dfo-mpo.gc.ca

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: April-16-18 3:08 PM
To: Smith, Colleen A; Jalloh, Rugi; Wambolt, Michael
Cc: Sarah Devereaux; March, Karen; Fraser, Terri; Mike Wilson; Kathy Cloutier; 176461
Subject: NPNS: Update on Marine Geotechnical and Harbour Bottom Survey

Good afternoon Colleen,

As discussed, the advance marine surveys are underway for the outfall pipe route for the proposed Effluent Treatment Facility at Northern Pulp.

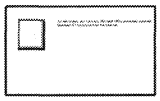
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On Saturday, the sidescan sonar was completed, and the magnetometer is out today. Geotechnical to follow. They are on track to be out of the water by/on April 29th and are working to complete as soon as possible.

I will plan to provide a similar update next week. Do let us know if you have any other questions in the mean time.

Regards,

Annamarie



Annamarie Burgess
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
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2018-001-01209



L'UNION DES PÊCHEURS DES MARITIMES
THE MARITIME FISHERMEN'S UNION
Tel 506.532.2485 408 rue Main St
Fax 506.532.2487 Shediac NB
shediac@mfu-upm.com E4P 2G1
www.mfu-upm.com

REC'D O REÇU
JUN 07 2018

May 18th, 2018

The Honourable Catherine McKenna
Minister of Environment and Climate Change
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Minister:

Re: Request for Designation for CEAA Federal Assessment - Northern Pulp Effluent Treatment Facility

On behalf of the Maritime Fishermen's Union I am writing to have the Northern Pulp's Effluent Treatment Project designated a project for Federal Environmental Assessment under Section 14 of the Canadian Environmental Assessment Act (CEAA) 2012.

The Northumberland Strait is a rich and vital fishing ground. Nova Scotia is Canada's number one seafood exporter, the province's two-billion-dollar seafood industry is built on the reputation of seafood harvested in a responsible manner from clean and environmentally sustainable waters.

We are very concerned that Northern Pulp's proposal to discharge 70-90 million litres of treated effluent from the bleached kraft mill every day through a 10.5k pipe will harm the fish and fish habitat in the Northumberland Strait. The Northumberland Strait consists of prime fishing grounds that support fish harvesters, their families and our coastal communities. We know that a Federal government study recently concluded that even when meeting federal regulations, 70% of pulp mills in Canada continue to have harmful effects on aquatic life and habitat. Franky, we are scared for the livelihoods of our fishing communities. Thousands of families from all three provinces, including First Nation communities make their living from the Northumberland Strait.

Our association and our industry as a whole is working hard to prove to the world that our fisheries are clean and sustainable. As Minister of the Environment we are sure you are aware that global consumers are demanding more and more that they know where their food comes from and that it is indeed clean and sustainable. We do not need to remind you that the fishing industry is one of the most lucrative industries on Canada's East Coast. This issue, if not handled properly, will indeed affect the reputation of the fishing industry in Canada as a whole.

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Handling the issue responsibly includes, as stated above, a Federal Environmental Assessment under Section 14 of the Canadian Environmental Assessment Act (CEAA) 2012.

We implore you, Minister McKenna, to support our fishing communities through ensuring a marine environment in the Northumberland Strait that Canada will be proud of on any international stage.

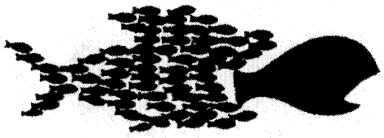
Sincerely,



Martin Mallet
Executive Director
Maritime Fishermen's Union

Cc:
Dominic Leblanc, Minister of Fisheries, Oceans and the Canadian Coast Guard, Room 420-N, Centre Block, Parliament Hill, Ottawa, ON,K1A 0A2
Iain Rankin, Department of Environment, 1894 Barrington Street, Suite 1800, P.O. Box 442, Halifax, NS, B3J 2P8
Canadian Environmental Assessment Agency NS Regional Office, Northern Pulp file, 200-1801 Hollis Street, Halifax, NS, B3J 3N4

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L'UNION DES PÊCHEURS DES MARITIMES
THE MARITIME FISHERMEN'S UNION
Tel 506.532.2485 408 rue Main St
Fax 506.532.2487 Shediac NB
shediac@mfu-upm.com E4P 2G1
www.mfu-upm.com

le 28 mai 2018

L'honorable Catherine McKenna
Ministre de l'Environnement et du Changement climatique
Chambre des communes, Ottawa (Ontario)
K1A 0A6

Objet : Demande de désignation aux fins de l'évaluation fédérale en vertu de la LCEE - Installation de traitement des effluents de la compagnie Northern Pulp

Madame la Ministre,

Au nom de l'Union des pêcheurs des Maritimes, je vous écris pour que le Projet de traitement des effluents de la compagnie Northern Pulp soit désigné comme projet aux fins de l'évaluation environnementale fédérale en vertu de l'article 14 de la Loi canadienne sur l'évaluation environnementale (LCEE) 2012.

Le détroit de Northumberland est un lieu de pêche riche et vital. La Nouvelle-Écosse est le premier exportateur de produits de la mer du Canada. L'industrie des produits de la mer de la province, qui représente deux milliards de dollars, est fondée sur la réputation des produits de la mer récoltés de façon responsable dans des eaux propres et durables sur le plan environnemental. Nous sommes très préoccupés par le fait que la proposition de Northern Pulp consiste à rejeter chaque jour de 70 à 90 millions de litres d'effluents d'usine de pâte kraft blanchie qui nuiront au poisson et à son habitat dans le détroit de Northumberland. Le détroit de Northumberland représente un lieu de pêche de premier choix qui soutient les pêcheurs, leurs familles et nos collectivités côtières. Nous savons qu'une étude du gouvernement fédéral a récemment conclu que, même si les règlements fédéraux sont respectés, 70% des usines de pâtes et papiers au Canada continuent d'avoir des effets néfastes sur la vie aquatique. Par conséquent, nous avons des craintes justifiées que ce projet affecte la subsistance de nos communautés de pêche. Des milliers de familles des trois provinces, y compris les collectivités des Premières nations, gagnent leurs vies dans le détroit de Northumberland.

Notre association et notre industrie dans son ensemble travaillent fort pour prouver au monde entier que nos pêches sont propres et durables. En tant que ministre de l'Environnement, vous comprenez que les consommateurs du monde entier exigent de plus en plus à connaître la provenance de leur nourriture et qu'ils désirent s'assurer qu'elle est en effet propre et durable. Nous n'avons pas besoin de vous rappeler que l'industrie de la pêche est l'une des industries les plus lucratives de la côte Est du Canada. Si cette question n'est pas traitée correctement, elle pourrait affecter la réputation de l'industrie de la pêche canadienne dans son ensemble. Le

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traitement responsable de la question comprend, comme il est indiqué ci-dessus, une évaluation environnementale fédérale en vertu de l'article 14 de la Loi canadienne sur l'évaluation environnementale (LCEE) 2012.

Nous vous implorons d'appuyer nos communautés de pêche en assurant un environnement marin dans le détroit de Northumberland, dont le Canada sera fier sur la scène internationale. Veuillez agréer, Madame la ministre, l'expression de nos sentiments les meilleurs.

Martin Mallet
Directeur général
Union des pêcheurs des Maritimes

Cc :
Dominic Leblanc, ministre des Pêches, des Océans et de la Garde côtière canadienne, pièce 420-N, édifice du Centre, Colline du Parlement, Ottawa (Ontario) K1A 0A2.
Iain Rankin, ministère de l'Environnement, 1894, rue Barrington, bureau 1800, C.P. 442, Halifax (Nouvelle-Écosse) B3J 2P8.
Agence canadienne d'évaluation environnementale Bureau régional de la Nouvelle-Écosse, Northern Pulp file, 200-1801 Hollis Street, Halifax (Nouvelle-Écosse) B3J 3N4.

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Smith, Colleen A

From: Flanagan, Jason <jason.flanagan@tc.gc.ca>
Sent: May-22-18 1:32 PM
To: Smith, Colleen A; Maclean,Lachlan [CEAA]
Cc: Wambolt, Michael
Subject: RE: Section 67 Question
Attachments: Re: Section 67 Question

Thanks Colleen, and good point. Lauchie had made the same request to me last Friday; attached is my answer, which interestingly addresses your point about what is meant by accident or malfunction.

Lauchie, would it be possible to get a summary or something of the discussions and questions raised last Wednesday in your meeting with PFN? As mentioned to you before, if TC requires a review pursuant to CEAA 2012 s.67, the scope would only include those portions of the project on Federal lands, and our approach would most likely be to coordinate / be involved with the Provincial EA as the Provincial EA would have a much larger scope that would probably include those portions for wich TC may have regulatory role (i.e. NPA approval and/or Lease/License).

J. Jason Flanagan, M.Sc.

Senior Environmental Assessment Officer
Transport Canada, Atlantic Region
Environmental Affairs and Aboriginal Consultation Unit
jason.flanagan@tc.gc.ca | Tel. : 506.227.8257 | TTY: 1.888.675.6863

Agent principal d'évaluation de l'environnement
Transports Canada, Région de l'Atlantique
Affaires environnementales et Service de consultation auprès des Autochtones
jason.flanagan@tc.gc.ca | Tél. : 506.227.8257 | ATS: 1.888.675.6863

From: Smith, Colleen A [mailto:Colleen.Smith@dfo-mpo.gc.ca]
Sent: Tuesday, May 22, 2018 10:38 AM
To: Maclean,Lachlan [CEAA] <Lachlan.Maclean@ceaa-acee.gc.ca>
Cc: Flanagan, Jason <jason.flanagan@tc.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>
Subject: RE: Section 67 Question

Hi Lauchie,

DFO has not yet made a determination on the requirement for a Fisheries Act Authorization; therefore; we cannot determine our role in the CEAA Section 67 PED/EED. Instead, your question should be directed to Jason Flanagan with Transport Canada. For Jason's benefit you should comment on what you mean by accident or malfunction. Are you referring to the pulp effluent or are you referring to construction equipment while building the pipe?

Thanks,
Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management
Fisheries and Oceans Canada
1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2

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Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Maclean,Lachlan [CEAA] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: May-18-18 3:24 PM
To: Smith, Colleen A
Subject: Section 67 Question

Hi Colleen

When conducting an assessment under Section 67 does DFO consider Accidents and Malfunctions?

Thanks
Lauchie

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

Government of Canada Gouvernement du Canada

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Smith, Colleen A

From: Flanagan, Jason <jason.flanagan@tc.gc.ca>
Sent: May-18-18 3:47 PM
To: Maclean,Lachlan [CEAA]
Subject: Re: Section 67 Question

Yes for the construction and installation. Our Environmental Effects Determination (EED) is similar to our EA screening templates under the former CEAA.

Sent from my BlackBerry 10 smartphone on the Rogers network.

From: Maclean,Lachlan [CEAA]
Sent: Friday, May 18, 2018 3:27 PM
To: Flanagan, Jason
Subject: Section 67 Question

Hi Jason

When conducting an assessment under Section 67 does TC consider Accidents and Malfunctions?

Thanks
Lauchie

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

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Canada

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Hawkins, Russell

From: King, Rhea L
Sent: Wednesday, May 23, 2018 3:04 PM
To: Winfield, Nicholas; Marquis, Hélène; Hebert, Alain
Subject: FW: INFORMAL Request: Update on Northern Pulp

FYI

Rhea

From: Rossignol, Pauline
Sent: May-23-18 1:37 PM
To: King, Rhea L
Cc: McLean, Mark G; Wambolt, Michael
Subject: RE: INFORMAL Request: Update on Northern Pulp

Thank you!

From: King, Rhea L
Sent: May-23-18 1:08 PM
To: Rossignol, Pauline
Cc: McLean, Mark G; Wambolt, Michael
Subject: FW: INFORMAL Request: Update on Northern Pulp

Hi Pauline,

We are currently developing a formal memo on this project which will be routed through the system (including DMO) soon, and we continue to provide weekly updates at our MINO briefing (as requested). Here are a few bullets concerning this project and our involvement:

- DFO is awaiting details of the design and construction of the pipeline and outfall to determine if a *Fisheries Act* Authorization is required.
- DFO will not be reviewing details of the effluent, but will provide Nova Scotia Environment (NSE) and Environment and Climate Change Canada (ECCC) with details on the various fisheries and aquatic species and habitats in the area.
- The NSE is expecting to start the environmental assessment process in the coming months.
- The Canadian Environmental Assessment Agency (CEAA) has been receiving requests for the new effluent plant and outfall to be reviewed under CEA Act.
- CEAA requested that DFO provide Indigenous fishery information in the Pictou area in advance of a meeting with Pictou Landing First Nation on May 16th to discuss a possible review under CEAA.
- Although the potential release of effluent is receiving strong opposition from the Indigenous and fishing communities, DFO's role in the project consists of physical project activities (i.e. submerged pipe installation) that are routinely reviewed by the Fisheries Protection Program.
- The key message that we have been communicating externally is that DFO will provide expert advice on the existing environment and make our regulatory decision on the physical impacts of the project; however, any questions related to the effluent should be directed to ECCC or NSE.

Please let me know if there are any questions.

Rhea

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From: Rossignol, Pauline
Sent: May-22-18 5:45 PM
To: King, Rhea L
Cc: McLean, Mark G; Wambolt, Michael
Subject: Fw: INFORMAL Request: Update on Northern Pulp

Hi Rhea, as per below, could I please have an update on Northern Pulp by 10:00 am Thursday, May 24th please. Tks

Pauline

Sent from my BlackBerry 10 smartphone on the Rogers network.

From: Jarjour, Jasmine <Jasmine.Jarjour@dfo-mpo.gc.ca>
Sent: Tuesday, May 22, 2018 4:48 PM
To: Rossignol, Pauline
Cc: Malko, Carol; Bilmer, Angela
Subject: INFORMAL Request: Update on Northern Pulp

Hi Pauline,
Catherine would like a brief/update on this file. Would it be possible to get some bullets, ideally by COB on Thursday, including key issues, DFO role and next steps?
Jasmine

From: Kahn, Zoe
Sent: May-22-18 9:50 AM
To: Butcher, Ashley; Malko, Carol; Jarjour, Jasmine
Subject: Question- who would be the lead within DFO on this file....

The growing impatience of an industry town: 'This has really created tension'

PICTOU, N.S. -- The picturesque harbour town of Pictou, N.S., has had an uneasy relationship with its job-rich, toxin-spewing neighbour almost since it opened in 1967.

Now, the Northern Pulp mill is facing a possibly existential challenge over the massive amounts of effluent it casts off each day.

After years of pumping 70 million litres of treated wastewater a day into lagoons on the edge of the **Pictou Landing** First Nation reserve, Northern Pulp wants to pipe it into the nearby Northumberland Strait.

The pulp mill -- a key engine of employment in northeastern Nova Scotia and vital to the local forestry sector -- says no pipe means no mill.

But some properties in the town are sprinkled with "No Pulp Waste In Our **Water**" signs, an indication of increasing impatience with Northern Pulp and its spotty environmental record under a succession of owners.

"This has really created tension ... and it's split some families and friends," said Karla MacFarlane, a

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Pictou resident who is the local MLA and interim leader of the provincial Progressive Conservatives. Under provincial **legislation**, the mill has until 2020 to replace its current wastewater treatment plant in **Boat** Harbour.

The wastewater lagoons contain nearly 50 years worth of toxic waste that provincial **Environment** Minister Iain Rankin has called one of the worst cases of environmental racism in the province, and possibly Canada.

It has been a major concern for the local **Mi'kmaq** community, which launched a lawsuit in 2010 seeking to eject the treatment plant from its land.

The band later erected a blockade to protest a leak in a pipe carrying toxic mill wastewater to the treatment plant in June 2014. The Liberal government promised to clean up the site, which led to legislation passed in 2015.

At the time, Chief Andrea Paul said she was encouraged by the government's commitment to **Pictou Landing** and "to the greater community."

In a recent interview, Paul said she was still optimistic the cleanup of the treatment lagoons -- estimated at more than $133 million so far -- would proceed as promised.

But Paul said her community shares concerns expressed by **fishermen** around the Northumberland Strait region about a potential effluent pipe.

She said residents wonder how a half-century of mill operations might have affected their health and the **environment**, and there is a lack of trust because of a belief that "the mill has definitely gotten away with a lot of things."

"Past governments have allowed it to happen because industry is important in our province," Paul said. "I would like to see a solution that works for everyone because the last thing I want is for people to be out of work, but we also can't jeopardize a huge **fishing industry** either."

It's a sentiment shared by MacFarlane, who admits to being torn -- her father and many relatives have worked either directly or indirectly for the mill, and it currently employs more than 300 people. Her views began to change when she returned to Pictou after living away for most of her 20s. The mill's strong sulphur odours and air emissions were omnipresent.

She said the smell permeated her waterfront retail outlet, the Ship Hector Company Store, forcing her at times to offer discounts on the shirts sold there.

"So no doubt we lost money because of that," said MacFarlane. "Was it an everyday occurrence? Absolutely not, but it certainly happened frequently."

Northern Pulp recently completed the $36.9 million replacement project for the stack known as a precipitator. It uses static electricity to remove solid chemical particles, and critics acknowledge the work has led to a significant improvement in air quality.

Still, the mill struggled with emissions and was last fall fined $700 by the province after a stack test found the particulate matter emitted exceeded limits.

Premier Stephen McNeil publicly questioned whether the small fine was enough of a deterrent. The

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Environment Department's deputy minister has also said the mill has been the subject of 12 "actions" by the department since 2012.

Kathy Cloutier, spokeswoman for the mill's parent company, Paper Excellence, said Northern Pulp has worked to improve its impact on the **environment**.

"There has been in the span since 2011 to the present time a significant commitment and investment by Paper Excellence to reduce the mill's environmental footprint," said Cloutier.

She said the company "acknowledges the history," but believes the new treatment plant project represents an opportunity. "We are in a position to be part of ending a legacy that is very negative and start anew with this new
system and the continued commitment of Paper Excellence and Northern Pulp," said Cloutier. "The challenge is ensuring the consistency, and I think we have been working very hard to show the consistency."

Cloutier said Northern Pulp will continue to engage the community, including **fishermen**.
In February, groups representing **fishermen** in Nova Scotia, P.E.I., and New Brunswick suspended further meetings with the mill after voicing frustration over its insistence on a pipe.

"We've asked them for Plan B and they said no," said Ronald Heighton, president of the Northumberland **Fishermen**'s Association.

"We told them our stance hasn't changed, there'll be no pipe in the Strait. Their comment at the time was, no pipe, no mill, and so I said I guess we are at an impasse."

The company said it had thoroughly investigated the treatment options available to bleached kraft mills like Northern Pulp, which produce a higher quality paper.

"Technical options available must include an outfall discharge in order for Northern Pulp to operate. The bottom line is no pipe equals no mill."

The mill announced its plan for a new treatment plant in December.

It calls for a system that would meet all federal environmental standards for suspended solids and oxygen depletion. Effluent would be carried by polyethelyne pipe across Pictou Harbour and released through six dispersal pipes into the Strait.

Cloutier said the proposed system would reduce the need for bleaching chemicals by about 30 to 40 per cent.

Critics including environmental groups and Prince Edward Island Premier Wade MacLauchlan say the mill's plan could have unintended consequences for **fisheries** in the area. They have called for a comprehensive federal assessment along with a more comprehensive Class 2 provincial assessment, as is being done for the treatment lagoon cleanup.

Pictou Mayor Jim Ryan said the town is also calling for a Class 2 assessment and the lack of one adds to the overall lack of trust in the community in the mill and its provincial overseers.

Ryan said he sees it in emails and conversations with people in the community.

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"There tends to be an idea, or a thought out there, that the decision has already been made by Nova Scotia **Environment**. I'm not going to suggest that's the case, but there are people out there who are implying that for sure."

Northern Pulp is to submit an **environmental assessment** to Nova Scotia's **Environment** Department sometime in July.

In the meantime, MacFarlane said it appears positions are hardening, even her own.

"I don't want the mill to close," she said. "But I can tell you right now I will never protect jobs over health ... or do anything damaging to our **environment**."
Keith Doucette, The Canadian Press
© 2018 The Telegram (St. John's) (web site).

Zoe Kahn
Chief of Staff/ Chef de cabinet
Deputy Minister's Office/ Cabinet du sous-ministre
Fisheries and Oceans Canada/ Pêches et Océans Canada
Tel: (613) 993-9226

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Wambolt, Michael

From: Smith, Colleen A
Sent: May-29-18 10:44 AM
To: Wambolt, Michael
Subject: RE: Ecological Components of Interest

Follow Up Flag: Follow up
Flag Status: Completed

Updated, please replace with this email and delete the other.
Colleen

From: Smith, Colleen A
Sent: May-29-18 10:13 AM
To: Wambolt, Michael
Subject: RE: Ecological Components of Interest

Hi Mike,

Here is my proposed response to Lauchie, CEAA:

Currently, to create a marine refuge in our oceans, Fisheries and Oceans Canada uses licence conditions or variation orders to restrict fishing in a specified area. In SFA 24 (scallop fishery), there is a scallop buffer zone along the coastline of the Northumberland Straight (including Pictou Harbour) whereby licence conditions restrict the use of bottom dragging scallop fishing gear. While these licence conditions can be in place for long periods, they are not designed to address long-term biodiversity goals, and could be changed or cancelled at any time. Under the proposed changes to the Fisheries Act, regulations could be made to establish long-term fishing restrictions (marine refuge) for the purpose of conserving marine biodiversity.

A marine refuge is a fisheries management measure that is put in place to protect important species and their habitat. It must meet all 5 of these criteria:

- Geographic location must be clearly defined.
- Stock management or conservation objectives need to directly relate to an important species or habitat.
- The area must contain an important species and important habitat.
- The measures must be long term.
- The measures need to protect the important species and its habitat from both existing and foreseeable pressures.

It is important to note that restrictions for marine refuges are limited to fishing activity only. Non-fishing related impacts are managed through other sections of the Fisheries Act (sections 35 and 36and other legislations such as the Canadian Environmental Protection Act; Species at Risk Act and Navigable Waters Act.

For the Northern Pulp and Paper, Effluent Treatment project, the Fisheries Protection Program (FPP) will review proposed works, undertakings and/or activities (physical construction of the pipe) under Section 35 of the Fisheries Act to determine if the proposed project will cause serious harm to fish. If it is determined that the

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physical works will cause serious harm to fish, an authorization will be required under subsection 35(2). As a part of the authorization process FPP will review section 6 factors including:

- the contribution of the relevant fish to the on-going productivity of commercial, recreational or Aboriginal fisheries;
- fisheries management objectives (marine refuge);
- whether there are measures and standards to avoid, mitigate or offset serious harm to fish that are part of a commercial, recreational or Aboriginal fisher; and
- public interest.

FPP is currently awaiting detailed information of the habitat and the construction methodology so that a determination can be made.

Thank you,

****

Can you send this to the Gulf Region for their review and input.

Colleen

From: Wambolt, Michael
Sent: May-29-18 8:05 AM
To: Smith, Colleen A
Subject: RE: Ecological Components of Interest

Hi Colleen,
Could you please draft a couple of paragraphs outlining what a Marine Refuge is, how it applies and how we factor it into our review. I will review then we can send it to the Gulf Region for review before we respond to Lauchie.

We will need to clarify that this is a Fisheries Act closure measure and does not prohibit other activities.

Thanks,

Mike Wambolt
Section Head
Marine Unit
902-402-5851

Fisheries Protection Program | Programme de Protection des Pêches
Ecosystem Management | Gestion des Ecosystemes
Maritimes Region | Region des Maritimes
Fisheries and Oceans Canada | Pêches et Océans Canada
Government of Canada | Gouvernement du Canada
PO Box 1006, Station B410, Dartmouth, NS B2Y 4A2 | CP 1006, Station B410, Dartmouth, N-É B2Y 4A2

From: Smith, Colleen A
Sent: May-28-18 3:29 PM
To: Wambolt, Michael
Cc: Jalloh, Rugi
Subject: FW: Ecological Components of Interest

Hi Mike,

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Should I request input from our friends in the Oceans Program in the Gulf Region?

Thanks,
Colleen

From: Maclean,Lachlan [CEAA] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: May-28-18 1:44 PM
To: Smith, Colleen A
Subject: Ecological Components of Interest

Hi Colleen

When we met with Pictou Landing First Nation regarding the Replacement Northern Pulp Effluent Treatment Facility (the Pipe), one of their questions concerned what they termed a marine refuge, but I believe it is the Scallop Buffer Zone (SFA 24).

http://www.dfo-mpo.gc.ca/oceans/oeabcm-amcepz/refuges/sfa-zpp-eng.html

Their question was around: How is laying a pipeline allowed over this marine refuge (SFA 24)? It seems to me to be solely restricting scallop dragging. Could you confirm this and why a pipe laid down in this area would be permitted?

Thanks
Lauchie

Ecological Components of Interest
The following ecological components of interest are conserved through the prohibitions.
Species of regional importance: juvenile American lobster

- **Why it is important**: American lobster is a commercially important species.

Habitat that is important to biodiversity conservation: American lobster nursery habitat

- **Why it is important**: American lobster nursery habitat is important for the life-cycle of the species.

Prohibitions
Scallop dragging.
No other human activities that take place in this area are incompatible with the conservation of the ecological components of interest.
Environmental Context
These closures offer protection to other important species and habitats in the southern Gulf of St. Lawrence. For example, SFA 22 contains the last remaining area in which the winter skate (a population under the endangered designation by COSEWIC) is found during the summer. It also includes a unique population of lady crab (suspected to be endemic to the region), and the rock crab (an important prey for several species and a commercial species).

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

No information has been removed or severed from this page

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Smith, Colleen A

From: Burgess, Annamarie <aburgess@dillon.ca>
Sent: May-29-18 3:41 PM
To: Butler, Sean
Cc: Smith, Colleen A
Subject: Re: Request for a shapefile of the NPP proposed pipe route
Attachments: NPNS_ImmediateStudyArea.zip

Thanks for confirming Sean. [redacted]
See file attached.
Cheers,
Annamarie

Annamarie Burgess, LPP, MCIP, P.Eng.
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca

Please consider the environment before printing this email

On Tue, May 29, 2018 at 3:32 PM, Butler, Sean <Sean.Butler@dfo-mpo.gc.ca> wrote:

Thanks Annamarie,

There shouldn't be a limit on the actual file name, just no spaces or special characters. You could try renaming it **ProjectStudyArea** in ArcCatalog.

All this being said, I don't think we mind waiting until your GIS specialist returns to the office if you want to hold off ☺.

Cheers, Sean

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: May-29-18 3:25 PM

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

To: Butler, Sean
Cc: Smith, Colleen A

Subject: Re: Request for a shapefile of the NPP proposed pipe route

Hi Sean,

I had noticed that. Sorry for the trouble.

My GIS specialist is now out for the afternoon. [redacted] still good enough to do a new export.

Remind me of current capacities, please - or as they may vary between software - are there any restrictions with the file name length?

Cheers,

Annamarie

Annamarie Burgess, LPP, MCIP, P.Eng.
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca
Please consider the environment before printing this email

On Tue, May 29, 2018 at 3:15 PM, Butler, Sean <Sean.Butler@dfo-mpo.gc.ca> wrote:

Hi Annamarie,

Thank you very much for the shape file. Unfortunately, the file is not opening correctly. The file name may be causing the error. Shape files shouldn't have any spaces in the file name, so you may need to have your GIS specialist rename and export the file again.

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Thanks very much.

Cheers, Sean

Sean Butler

Ecosystem Management Branch

Fisheries and Oceans Canada – Maritimes Region

Bedford Institute of Oceanography

1 Challenger Dr., PO Box 1006

4th Floor, Polaris Bldg.

Dartmouth, NS, B2Y 4A2

Tel: (902) 402-8342

Email: Sean.Butler@dfo-mpo.gc.ca

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: May-29-18 3:03 PM
To: Smith, Colleen A
Cc: March, Karen [redacted] Butler, Sean; Jalloh, Rugi
Subject: Re: Request for a shapefile of the NPP proposed pipe route

Hi Colleen,

Happy to do so - The attached zip folder contains the .shp used to generate the mapping shown at the December open houses and in the CEAA information submission (i.e. the map you referenced).

The shapefile, as you noted, represents the area within which the pipe was expected to be constructed.

However, CSR has discovered more underwater constraints than had been anticipated as I'm sure you realize from their ongoing sonar work.

It is appearing likely that segments of the pipe will be constructed outside of the mapped area.

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Once the route is confirmed we will of course advise.

Let me know if there's any trouble with the file itself or if you have any other questions in advance of Thursday.

Cheers,

Annamarie



Annamarie Burgess, LPP, MCIP, P.Eng.
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca
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On Tue, May 29, 2018 at 11:53 AM, Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca> wrote:

Hi Annamarie,

Can we get a shapefile of the attached figure? It doesn't have to be the exact route.

Thanks,

Colleen

From: Burgess, Annamarie [mailto:aburgess@dillon.ca]
Sent: May-28-18 5:02 PM
To: Smith, Colleen A
Cc: March, Karen [redacted] Butler, Sean; Jalloh, Rugi
Subject: Re: Request for a shapefile of the NPP proposed pipe route

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Hi Colleen,

I'm sorry I missed you this morning.

The pipeline route is not yet confirmed and so unfortunately we don't have a pipeline route to provide.

Likely Wednesday - due to anticipated winds tomorrow - CSR will be out again completing more sidebeam sonar.

Will you be joining the meeting on Thursday that NSE is hosting? We could discuss there with the group and see if we can answer any of your questions.

If not, do feel free to give me a shout again. I should be at my desk all day tomorrow.

Regards,

Annamarie

Annamarie Burgess, LPP, MCIP, P.Eng.
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca
Please consider the environment before printing this email

On Mon, May 28, 2018 at 10:24 AM, Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca> wrote:

Hello Annamarie,

I am writing to follow-up on the phone message I left you earlier this morning. Fisheries and Oceans Canada is requesting a shapefile of the proposed pipeline route to assist us with our analysis of the project. We would like to have this by the end of this week if possible.

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If you have any questions please do not hesitate to contact me.

Thank you,

Colleen

Colleen Smith, BSc.

Senior Fisheries Protection Biologist, Fisheries Protection Program

Ecosystem Management

Fisheries and Oceans Canada

1 Challenger Drive, PO Box 1006, Dartmouth, NS B2Y 4A2

Tel. 902-293-7834

Colleen.smith@dfo-mpo.gc.ca

This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

Ce message est destiné uniquement aux personnes indiquées dans l'entête et peut contenir une information privilégiée, confidentielle ou privée et ne pouvant être divulguée. Si vous n'êtes pas le destinataire de ce message ou une personne autorisée à le recevoir, veuillez communiquer avec le soussigné et ensuite détruire ce message.

This message is directed in confidence solely to the person(s) named above and may contain privileged, confidential or private information which is not to be disclosed. If you are not the addressee or an authorized representative thereof, please contact the undersigned and then destroy this message.

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Smith, Colleen A

From: Butler, Sean
Sent: May-30-18 10:00 AM
To: Smith, Colleen A; Wambolt, Michael; Jalloh, Rugi
Subject: Northern Pulp Proposed Pipeline Map
Attachments: NorthernPulp_Project_Proposed.pdf

Hi guys,

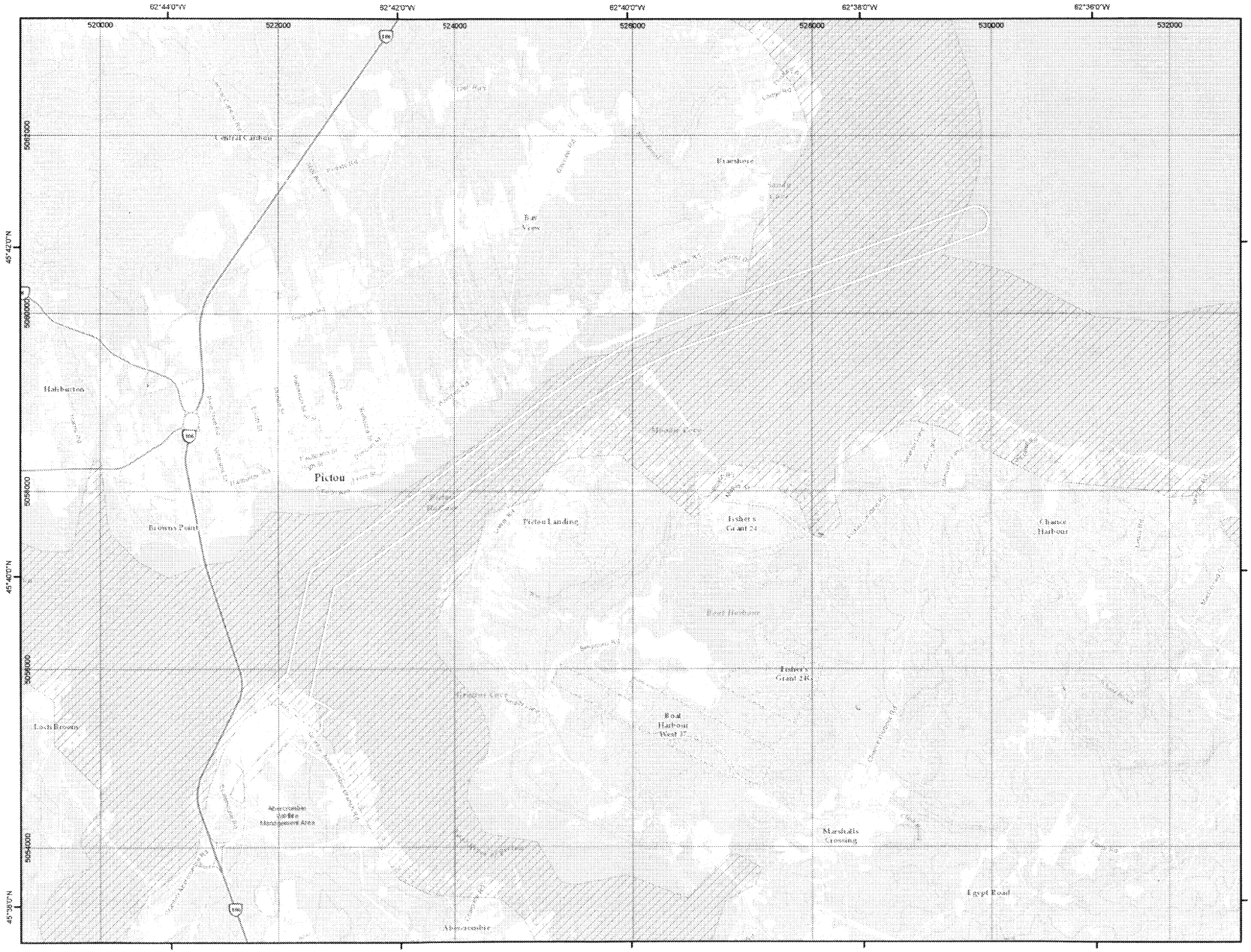
As discussed, please find attached map showing the proposed pipeline study area (caveats of this boundary included on map) for Northern Pulp in relation to the Marine Refuges boundary.

Let me know if you have any questions.

Cheers, Sean

Sean Butler
Ecosystem Management Branch
Fisheries and Oceans Canada – Maritimes Region
Bedford Institute of Oceanography
1 Challenger Dr., PO Box 1006
4th Floor, Polaris Bldg.
Dartmouth, NS, B2Y 4A2
Tel: (902) 402-8342
Email: Sean.Butler@dfo-mpo.gc.ca

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Fisheries and Oceans Canada | Pêches et Océans Canada

Ecosystem Management Branch

FISHERIES PROTECTION PROGRAM

Date: 30/05/2018

Northern Pulp Proposed Pipeline Study Area Pictou, Nova Scotia

MAP SCALE

1:40,000

N W E S

0 500 1,000 1,500

Metres

Print Size: 11" x 17"

Basemap © ESRI 2018

GEODETIC PARAMETERS

Horizontal Coordinate Reference System

UTM Z20N NAD83 (CSRS)

LEGEND

Proposed Pipeline Study Area*

Marine Refuge Boundary

** While the study area represents the general location in which the pipeline is expected to be constructed, segments of the pipemay be constructed outside this boundary due to underwater constraints identified during project surveys.*

This map has been prepared by Fisheries & Oceans Canada (DFO) from a variety of sources, and should be considered draft. Third party information cannot be confirmed or guaranteed by DFO. This map is prepared for planning purposes. The map may be subject to errors and is not intended for navigational purposes. (c) 2018 Property of Her Majesty The Queen.

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Wambolt, Michael

From: McLean, Mark G
Sent: May-30-18 2:00 PM
To: Smith, Colleen A; Wambolt, Michael
Cc: Hominick, Craig
Subject: RE: Ecological Components of Interest

Thanks Colleen, The change looks good to me.

Mark

From: Smith, Colleen A
Sent: Wednesday, May 30, 2018 1:57 PM
To: Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>
Cc: Hominick, Craig <Craig.Hominick@dfo-mpo.gc.ca>
Subject: RE: Ecological Components of Interest
Importance: High

Hello Mike and Mark,

I took a stab at addressing Mark's suggestion by adjusting the correspondence, the updated version is below.
Colleen
***
Marine refuges are geographic locations where fishing activity has various restrictions in place. Currently, to create a marine refuge in our oceans, Fisheries and Oceans Canada uses licence conditions or variation orders to restrict fishing in a specified area. In SFA 24 (scallop fishery), there is a scallop buffer zone along the coastline of the Northumberland Straight (including Pictou Harbour) whereby fishing licences have conditions that restrict the use of bottom dragging scallop fishing gear mainly for the protection of juvenile lobster habitat. While these licence conditions can be in place for long periods, they are not designed to address long-term biodiversity goals, and could be changed or cancelled at any time. Under the proposed changes to the *Fisheries Act*, regulations could be made to establish long-term fishing restrictions (marine refuge) for the purpose of conserving marine biodiversity.
A marine refuge is a fisheries management measure that is put in place to protect important species and their habitat. It must meet all 5 of these criteria:

- Geographic location must be clearly defined.
- Stock management or conservation objectives need to directly relate to an important species or habitat.
- The area must contain an important species and important habitat.
- The measures must be long term.
- The measures need to protect the important species and its habitat from both existing and foreseeable pressures.

Complimentary to any fishing restrictions, non-fishing related impacts are managed through other sections of the *Fisheries Act* (sections 35 and 36) and other legislations such as the *Canadian Environmental Protection Act; Species at Risk Act, Oceans Act and Navigable Waters Act.*

In relation to the Northern Pulp and Paper, Effluent Treatment Project, the Fisheries Protection Program will review the physical components of the proposed works, undertakings and/or activities (construction of the pipe)

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under Section 35 of the *Fisheries Act* to determine if the proposed project will cause serious harm to fish including an assessment on the impacts to juvenile lobster and its habitat. If it is determined that the physical works will cause serious harm to fish, an authorization will be required under subsection 35(2).

Our suggested messaging back to Pictou Landing is that:

- The Marine Refuge in Scallop Fishing Area 24 is a *Fisheries Act* closure that only applies to scallop dragging fishing activity.
- Complimentary to the Marine Refuge, Section 35 of the *Fisheries Act* pertains to non-fishing related activities. Under Section 35 of the *Fisheries Act*, the Fisheries Protection Program will review any potential physical impacts from the effluent treatment facility (i.e. laying the pipe) on fish and fish habitat including juvenile lobster.
- DFO is currently awaiting detailed information on the habitat and the construction methodology so that a *Fisheries Act* authorization decision related to the physical construction of the pipe can be made.

Thank you,
***

From: Wambolt, Michael
Sent: May-30-18 1:04 PM
To: Smith, Colleen A
Cc: Hominick, Craig; McLean, Mark G
Subject: Re: Ecological Components of Interest

Hi Colleen let's discuss Mark's revision and we can tell CEAA that we are preparing a response when we meet with them tomorrow.

We can get the response out Friday after Mark has had a chance to review again.

Thanks,

Mike Wambolt
902-402-5851

From: McLean, Mark G
Sent: Wednesday, May 30, 2018 12:48 PM
To: Wambolt, Michael; Smith, Colleen A
Cc: Hominick, Craig
Subject: RE: Ecological Components of Interest

Just one suggestion to consider before sending to CEAA. Could we make the link between the objectives of the Marine Refuge and the Section 35 review. As I understand it, the Marine Refuge is in place to protect juvenile lobster habitat from certain fisheries activities and the Section 35 FA review will assess any potential physical impacts from the project on fish habitat include impacts to juvenile lobster habitat. It would be good to highlight that these tool are complimentary in protecting fish habitat and that not having the Marine Refuge apply to activities other than fishing does not represent a gap. Thanks.

Mark

From: Wambolt, Michael
Sent: Wednesday, May 30, 2018 12:34 PM

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To: Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Cc: Hominick, Craig <Craig.Hominick@dfo-mpo.gc.ca>; McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>
Subject: RE: Ecological Components of Interest

[redacted] Colleen,
I have suggested some additional text below. If you agree please send to CEAA and copy me on the email.

Currently, to create a marine refuge in our oceans, Fisheries and Oceans Canada uses licence conditions or variation orders to restrict fishing in a specified area. In SFA 24 (scallop fishery), there is a scallop buffer zone along the coastline of the Northumberland Straight (including Pictou Harbour) whereby licence conditions restrict the use of bottom dragging scallop fishing gear. While these licence conditions can be in place for long periods, they are not designed to address long-term biodiversity goals, and could be changed or cancelled at any time. Under the proposed changes to the Fisheries Act, regulations could be made to establish long-term fishing restrictions (marine refuge) for the purpose of conserving marine biodiversity.
A marine refuge is a fisheries management measure that is put in place to protect important species and their habitat. It must meet all 5 of these criteria:

- Geographic location must be clearly defined.
- Stock management or conservation objectives need to directly relate to an important species or habitat.
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- The measures must be long term.
- The measures need to protect the important species and its habitat from both existing and foreseeable pressures.

It is important to note that restrictions for marine refuges are limited to fishing activity only and do not prohibit other activities. Non-fishing related impacts are managed through other sections of the Fisheries Act (sections 35 and 36 and other legislations such as the Canadian Environmental Protection Act; Species at Risk Act and Navigable Waters Act.

For the Northern Pulp and Paper, Effluent Treatment project, the Fisheries Protection Program (FPP) will review the physical components of the proposed works, undertakings and/or activities (construction of the pipe) under Section 35 of the Fisheries Act to determine if the proposed project will cause serious harm to fish. If it is determined that the physical works will cause serious harm to fish, an authorization will be required under subsection 35(2).

As I am sure you can appreciate marine refuges are a very sensitive topic now and it is challenging to communicate with Indigenous communities and stakeholders how it they are *Fisheries Act* closures that prohibit certain fishing activities but do not prohibit other anthropogenic activities.

Our suggested messaging back to Pictou Landing is that:

- DFO is currently awaiting detailed information on the habitat and the construction methodology so that a Fisheries Act Authorization decision related to the physical construction of the pipe can be made.

- The Scallop Buffer 24 area identified as a Marine Refuge is a *Fisheries Act* closure that only applies to fishing activity and does not prohibit other non-fishing related activities.

Thank you,

From: Wambolt, Michael
Sent: May-29-18 8:05 AM

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To: Smith, Colleen A
Subject: RE: Ecological Components of Interest

Hi Colleen,
Could you please draft a couple of paragraphs outlining what a Marine Refuge is, how it applies and how we factor it into our review. I will review then we can send it to the Gulf Region for review before we respond to Lauchie.

We will need to clarify that this is a Fisheries Act closure measure and does not prohibit other activities.

Thanks,

Mike Wambolt
Section Head
Marine Unit
902-402-5851

Fisheries Protection Program | Programme de Protection des Pêches
Ecosystem Management | Gestion des Ecosystemes
Maritimes Region | Region des Maritimes
Fisheries and Oceans Canada | Pêches et Océans Canada
Government of Canada | Gouvernement du Canada
PO Box 1006, Station B410, Dartmouth, NS B2Y 4A2 | CP 1006, Station B410, Dartmouth, N-É B2Y 4A2

From: Smith, Colleen A
Sent: May-28-18 3:29 PM
To: Wambolt, Michael
Cc: Jalloh, Rugi
Subject: FW: Ecological Components of Interest

Hi Mike,

Should I request input from our friends in the Oceans Program in the Gulf Region?

Thanks,
Colleen

From: Maclean,Lachlan [CEAA] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: May-28-18 1:44 PM
To: Smith, Colleen A
Subject: Ecological Components of Interest

Hi Colleen

When we met with Pictou Landing First Nation regarding the Replacement Northern Pulp Effluent Treatment Facility (the Pipe), one of their questions concerned what they termed a marine refuge, but I believe it is the Scallop Buffer Zone (SFA 24).

http://www.dfo-mpo.gc.ca/oceans/oeabcm-amcepz/refuges/sfa-zpp-eng.html

Their question was around: How is laying a pipeline allowed over this marine refuge (SFA 24)? It seems to me to be solely restricting scallop dragging. Could you confirm this and why a pipe laid down in this area would be permitted?

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Thanks
Lauchie

Ecological Components of Interest
The following ecological components of interest are conserved through the prohibitions.
Species of regional importance: juvenile American lobster

- **Why it is important**: American lobster is a commercially important species.

Habitat that is important to biodiversity conservation: American lobster nursery habitat

- **Why it is important**: American lobster nursery habitat is important for the life-cycle of the species.

Prohibitions
Scallop dragging.
No other human activities that take place in this area are incompatible with the conservation of the ecological components of interest.
Environmental Context
These closures offer protection to other important species and habitats in the southern Gulf of St. Lawrence. For example, SFA 22 contains the last remaining area in which the winter skate (a population under the endangered designation by COSEWIC) is found during the summer. It also includes a unique population of lady crab (suspected to be endemic to the region), and the rock crab (an important prey for several species and a commercial species).

Lachlan MacLean, PhD.

Project Manager, Atlantic Region
Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
lachlan.maclean@ceaa-acee.gc.ca / Tél : 902-426-8697

Government of Canada Gouvernement du Canada

Canada

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Smith, Colleen A

From: Smith, Colleen A
Sent: May-31-18 8:28 AM
To: Maclean,Lachlan [CEAA]
Cc: Jalloh, Rugi; Wambolt, Michael
Subject: RE: Ecological Components of Interest

Hi Lauchie,

Marine refuges are geographic locations where fishing activity has various restrictions in place. Currently, to create a marine refuge in our oceans, Fisheries and Oceans Canada uses licence conditions or variation orders to restrict fishing in a specified area. In SFA 24 (scallop fishery), there is a scallop buffer zone along the coastline of the Northumberland Straight (including Pictou Harbour) whereby fishing licences have conditions that restrict the use of bottom dragging scallop fishing gear mainly for the protection of juvenile lobster habitat. While these licence conditions can be in place for long periods, they are not designed to address long-term biodiversity goals, and could be changed or cancelled at any time. Under the proposed changes to the *Fisheries Act*, regulations could be made to establish long-term fishing restrictions (marine refuge) for the purpose of conserving marine biodiversity.
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- The measures need to protect the important species and its habitat from both existing and foreseeable pressures.

Complimentary to any fishing restrictions, non-fishing related impacts are managed through other sections of the *Fisheries Act* (sections 35 and 36) and other legislations such as the *Canadian Environmental Protection Act; Species at Risk Act, Oceans Act and Navigable Waters Act.*

In relation to the Northern Pulp and Paper, Effluent Treatment Project, the Fisheries Protection Program will review the physical components of the effluent pipe installation under Section 35 of the *Fisheries Act* to determine if the proposed project will cause serious harm to fish including an assessment on the impacts to juvenile lobster and its habitat. If it is determined that the physical works will cause serious harm to fish, an authorization will be required under subsection 35(2) of the *Fisheries Act.*

<u>Our suggested messaging back to Pictou Landing is that:</u>

- The Marine Refuge in Scallop Fishing Area 24 is a *Fisheries Act* closure that only applies to scallop dragging fishing activity.
- Complimentary to the Marine Refuge, Section 35 of the *Fisheries Act* pertains to non-fishing related activities. Under Section 35 of the *Fisheries Act*, the Fisheries Protection Program will review the physical impacts from the installation of the effluent pipe on fish and fish habitat.
- DFO is currently awaiting detailed information on the habitat and the construction methodology so that a *Fisheries Act* authorization decision related to the physical construction of the pipe can be made.

Thank you,

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Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management
Fisheries and Oceans Canada
PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Maclean,Lachlan [CEAA] [mailto:Lachlan.Maclean@ceaa-acee.gc.ca]
Sent: May-28-18 1:44 PM
To: Smith, Colleen A
Subject: Ecological Components of Interest

Hi Colleen

When we met with Pictou Landing First Nation regarding the Replacement Northern Pulp Effluent Treatment Facility (the Pipe), one of their questions concerned what they termed a marine refuge, but I believe it is the Scallop Buffer Zone (SFA 24).

http://www.dfo-mpo.gc.ca/oceans/oeabcm-amcepz/refuges/sfa-zpp-eng.html

Their question was around: How is laying a pipeline allowed over this marine refuge (SFA 24)? It seems to me to be solely restricting scallop dragging. Could you confirm this and why a pipe laid down in this area would be permitted?

Thanks
Lauchie

Ecological Components of Interest
The following ecological components of interest are conserved through the prohibitions.
Species of regional importance: juvenile American lobster

- **Why it is important**: American lobster is a commercially important species.

Habitat that is important to biodiversity conservation: American lobster nursery habitat

- **Why it is important**: American lobster nursery habitat is important for the life-cycle of the species.

Prohibitions
Scallop dragging.
No other human activities that take place in this area are incompatible with the conservation of the ecological components of interest.
Environmental Context
These closures offer protection to other important species and habitats in the southern Gulf of St. Lawrence. For example, SFA 22 contains the last remaining area in which the winter skate (a population under the endangered designation by COSEWIC) is found during the summer. It also includes a unique population of lady crab (suspected to be endemic to the region), and the rock crab (an important prey for several species and a commercial species).

Lachlan MacLean, PhD.

Project Manager, Atlantic Region

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Canadian Environmental Assessment Agency / Government of Canada
lachlan.maclean@ceaa-acee.gc.ca / Tel : 902-426-8697

Gestionnaire de projets, région atlantique
Agence canadienne d'évaluation environnementale / Gouvernement du Canada
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Government of Canada / Gouvernement du Canada

Canada

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NORTHERN PULP NOVA SCOTIA EFFLUENT REPLACEMENT PROJECT MEETING

May 31, 2018 at 10 am- 12:00 pm at BIO

ATTENDEES – STAKEHOLDERS: ECCC, DFO, NSE, NPNS, TC, HC, CEA Agency and Proponent's Consultant - Dillon Consulting.

Dillon Consulting provided presentation on project update; main points that came out of the presentation and other follow up questions are as follows:

- A number of shipwrecks, a collapsed wharf and ice scours were identified and as a result there is a need to relocate the pipe to ensure proper positioning and engineering. This may result a new outfall location and therefore new receiving water study must be done to model a new outfall location. This means that the target date of July 2018 will not be feasible.
- New timeline: work is anticipated to be completed between July and August of 2018.
- An investigation was done 2 kms beyond the existing location

Annamarie provided an update of consultations in December 2017 and January 2018 that Northern Pulp and Paper held including:

- Pictou Landing First Nation (60 participants including other fishing industry reps)
- Fishing industry specific meetings
- Two general open houses to the general public

Annamarie stated that in general, there has been a lot of opposition to the project and concerns about impacts to the environment from all groups mentioned above.

Crown – Duty to Consult with Aboriginal Groups

NSTIR have started an Indigenous Consultation process following the Terms of Reference. Gary mentioned that the KMKNO have indicated that they wish to consult and that Pictou Landing First Nation will lead the consultation process. He asked about a coordinated whole of government approach to consultation and when and if DFO will want to be included in the consultation process. FPP indicated that if DFO determines that there is a contemplated Crown conduct (*Fisheries Act* Authorization required) we will join into the Provincial process.

Environmental Assessment Requirements

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Provincial Environmental Assessment (EA)

It is anticipated that the EA will be registered in June 2018 as a Class 2 undertaking. Class 2 undertakings are typically larger in scale and are considered to have the potential to cause significant environmental impacts and concern to the public. These undertakings require an environmental assessment report and formal public review which may include hearings. DFO will participate in the review of the EA as an expert department to comment on potential impacts to fish and fish habitat from the physical impacts of the constriction of the effluent pipe.

CEAA 2012 – Section 67

This would be considered a physical activity in relation to a physical work located on federal lands. This project would meet these criteria. Section 67 responsibilities will be triggered to any Federal Department that issues a regulatory permit, approval or authorization in order for a project to proceed including potentially Transport Canada, Fisheries and Oceans Canada, Environment Canada and Climate Change.

Fisheries Act – Request for Review

FPP sent out a letter requesting information from the proponent in order for FPP to complete the review of the project enabling a decision to which an authorization is required for the project or not.

UBHS – The proponent is planning to carry out this work in April 2018 using an ROV. FPP stated that the ROV survey needs to encompass the footprint of the project and suggested that in areas of interest (hard bottom, macroalgal growth, eelgrass beds, mussel beds, etc.) that the ROV survey those areas to a larger extent to better classify the habitat in the footprint of the project. FPP also suggested that tow cameras or diver surveys may be more appropriate in some areas, depending on the site conditions and limitations. The proponent asked if there was an example of an underwater ROV that they could use to guide their work. FPP suggested that they view Offshore Oil and Gas Projects as they have used an ROV to survey the benthic habitat.

Geotechnical work - The proponent is planning to carry out this work in April 2018 along with the ROV survey. The results of the geotechnical work will determine what construction methodology will be possible for the physical construction of the pipe. FPP suggested that they also consider CHS data and information for benthic substrate types and potential locations for shipwrecks.

Environmental Protection Plan – The proponent wanted to know what level of detail would be required for an EPP for the request for review phase. FPP stated that it does not need a detailed plan until the proponent knows the details of the construction methodology. This would assist FPP in determining what, if any additional mitigation measures should be applied to reduce the impacts to fish and fish habitat.

Offsetting – The proponent asked if the result of the request for review determines that an Authorization is required for the project then what would the offsetting requirements be. FPP stated that we cannot answer that question until we know what the habitat is. Once we know more

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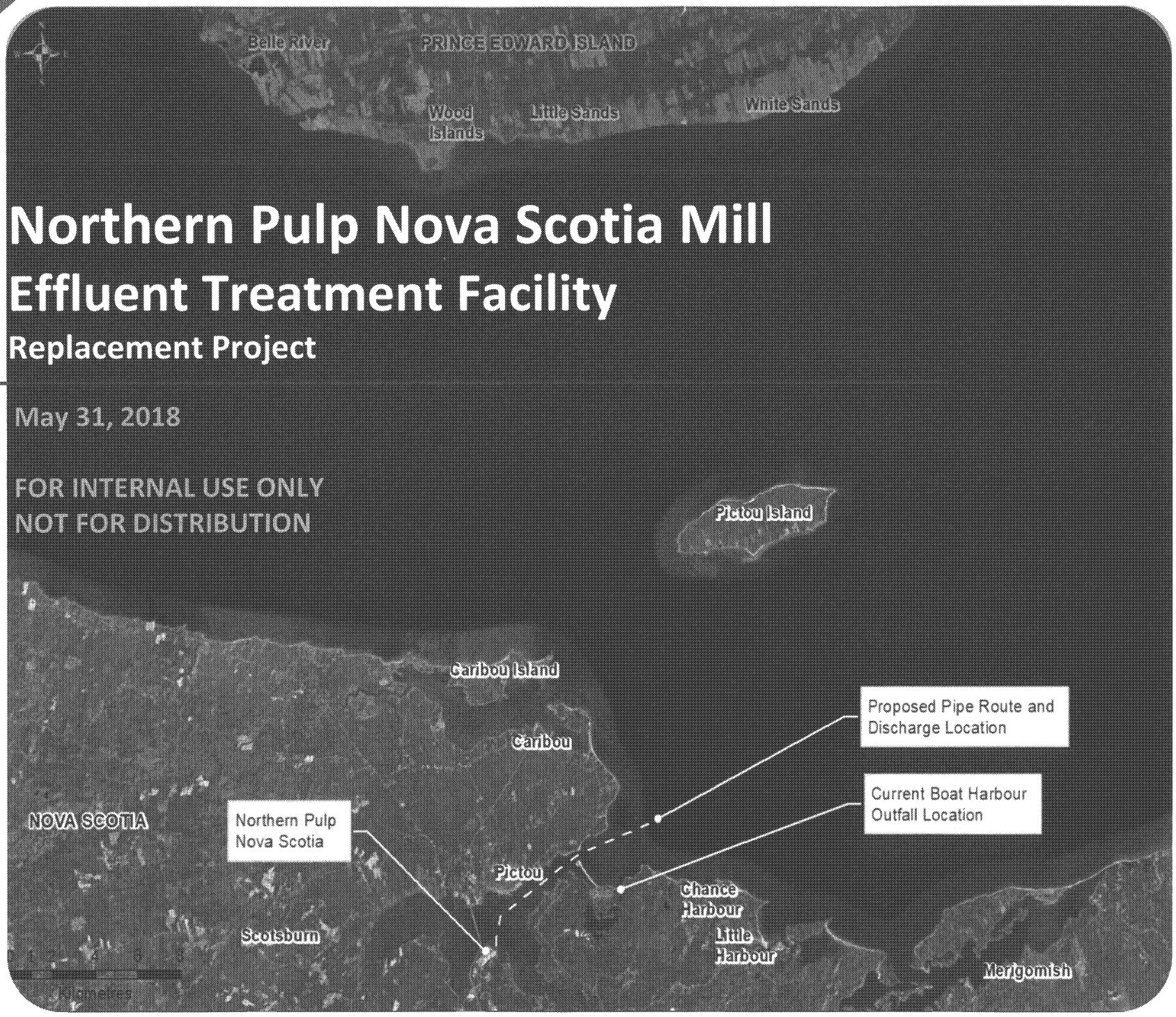
information we can have more informed discussions. FPP also suggested that the proponent could be proactively looking for offsetting opportunities.

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Northern Pulp Nova Scotia Mill
Effluent Treatment Facility
Replacement Project

May 31, 2018

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HISTORY OF THE BOAT HARBOUR TREATMENT FACILITY

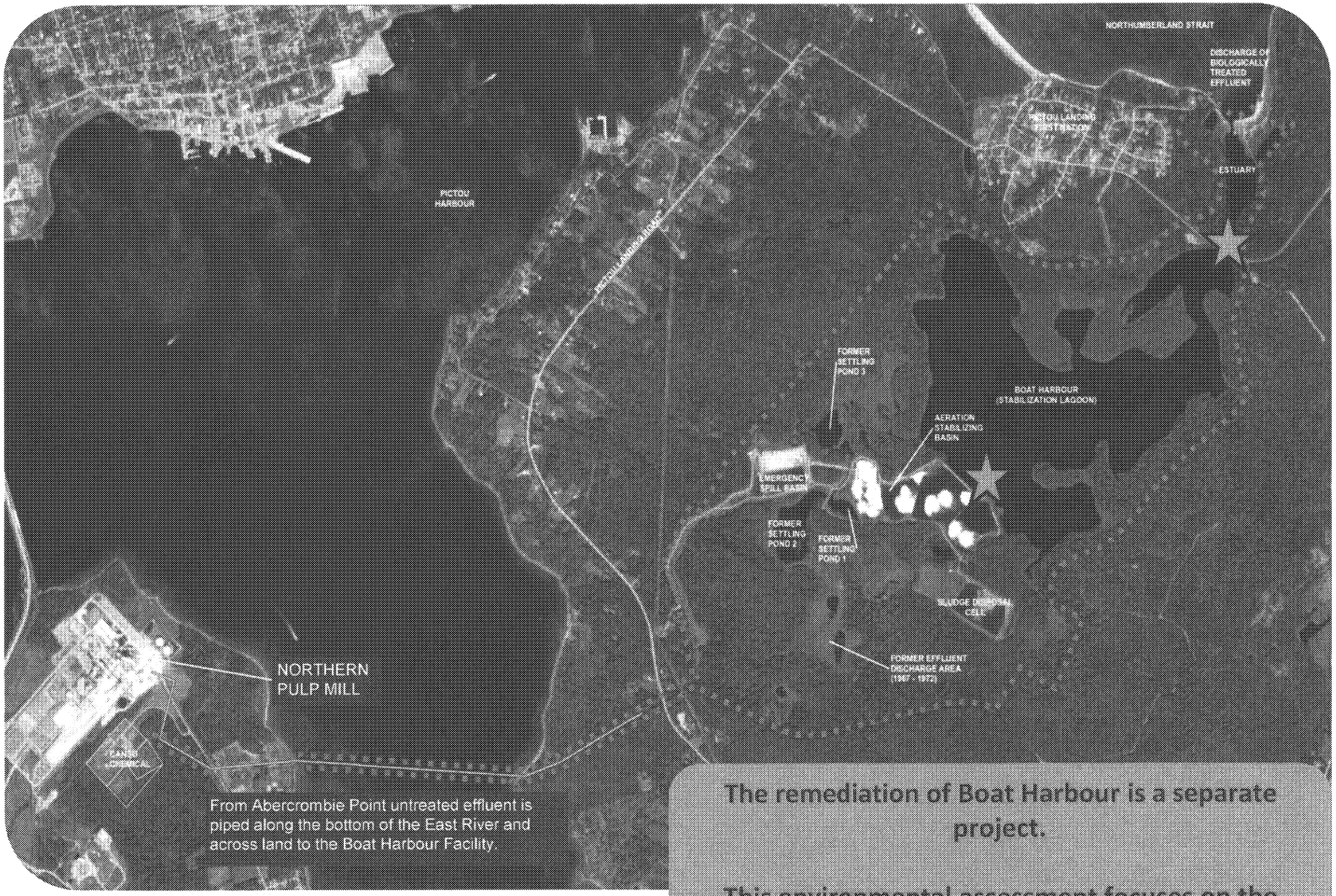
1965 As an incentive to attract industry to Pictou County, the provincial government offered raw water supply and effluent treatment to potential incoming industries.

3 companies were attracted to the County through these incentives (Michelin Tire, Northern Pulp's predecessor and Canso Chemicals).

Boat Harbour began operating as a treatment facility in 1967.

In 1995 NPNS took over operations of the facility under a lease agreement originally for 10 years, extended until 2030.

The Regulatory Point has moved from Point D (outlet of Boat Harbour) to Point C (at the outlet of the ASB system)



The remediation of Boat Harbour is a separate project.

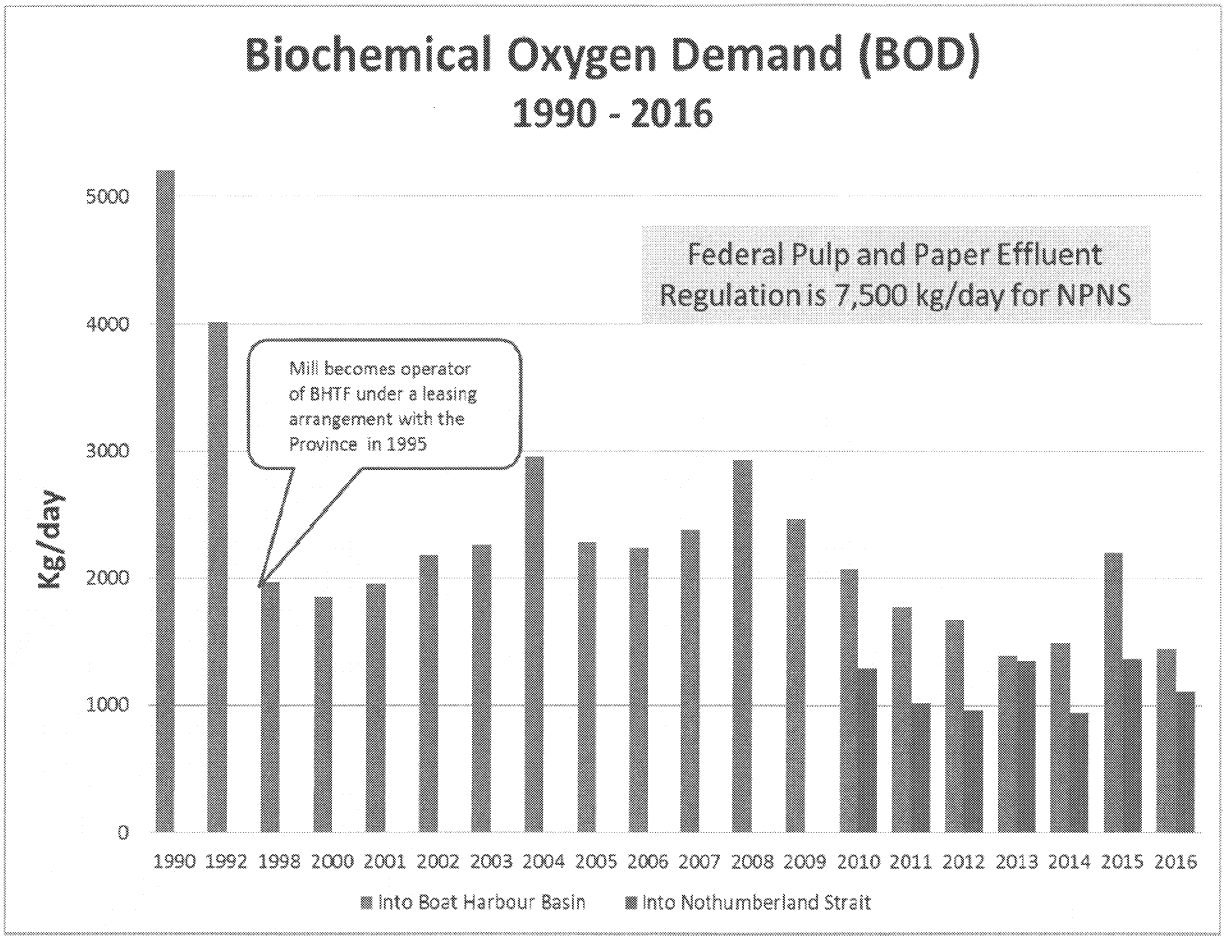
This environmental assessment focuses on the replacement of the effluent treatment facility only.

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EXISTING EFFLUENT QUALITY
BIOCHEMICAL OXYGEN DEMAND (BOD)

Historical improvements have been made with regards to organic loading in effluent.

Northern Pulp currently operates well under the PPER limit for BOD.



BOD - measure of organic pollutant in effluent
BOD is regulated by Environment Canada under PPER

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EXISTING EFFLUENT QUALITY
TOTAL SUSPENDED SOLIDS

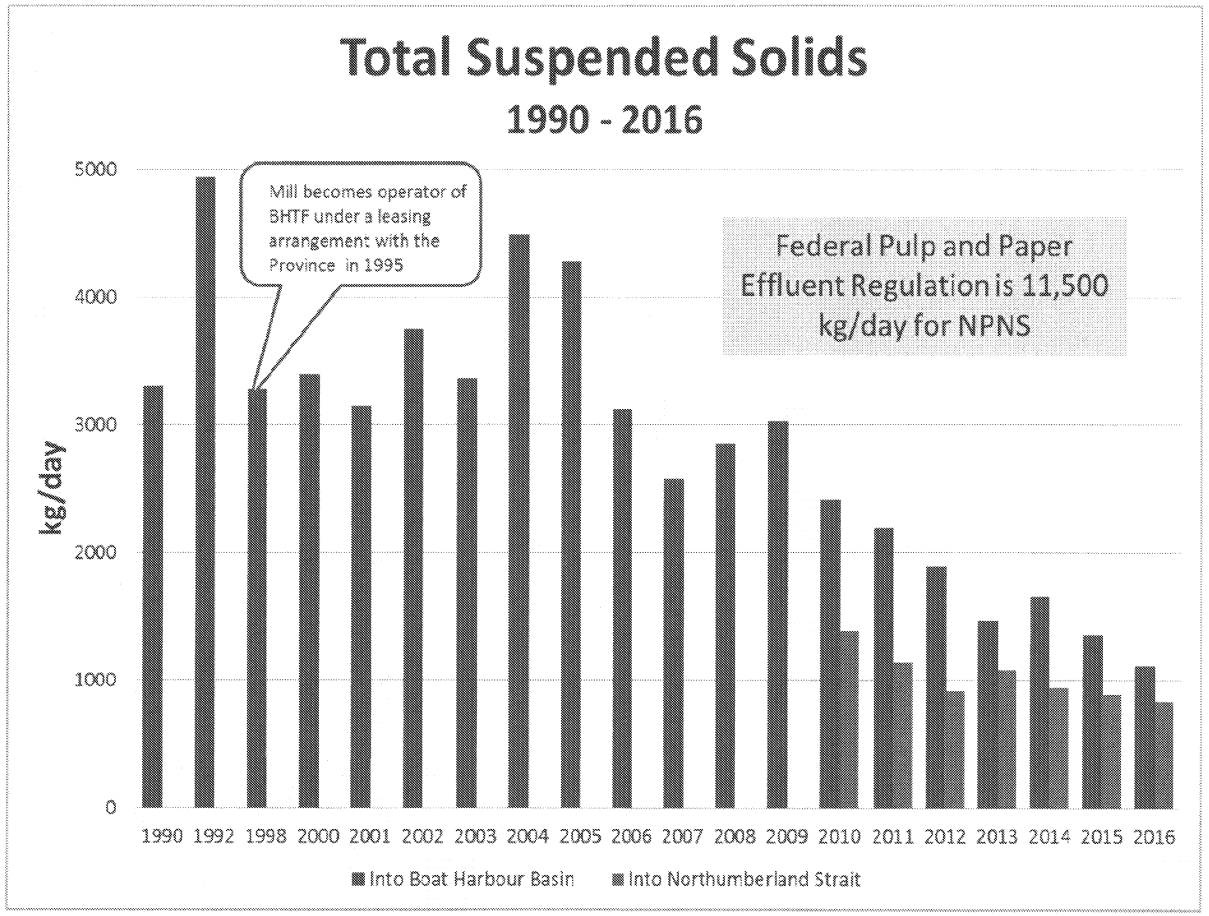
Historical improvements were made at NPNS regarding solids loading in effluent.

NPNS currently operates well under the PPER limit for TSS.

Switching to the AST Process will not have the polishing effect of the Boat Harbour Basin.

Solids loading will be similar to the current discharge of the ASB into the Boat Harbour basin and remain well below PPER limits.

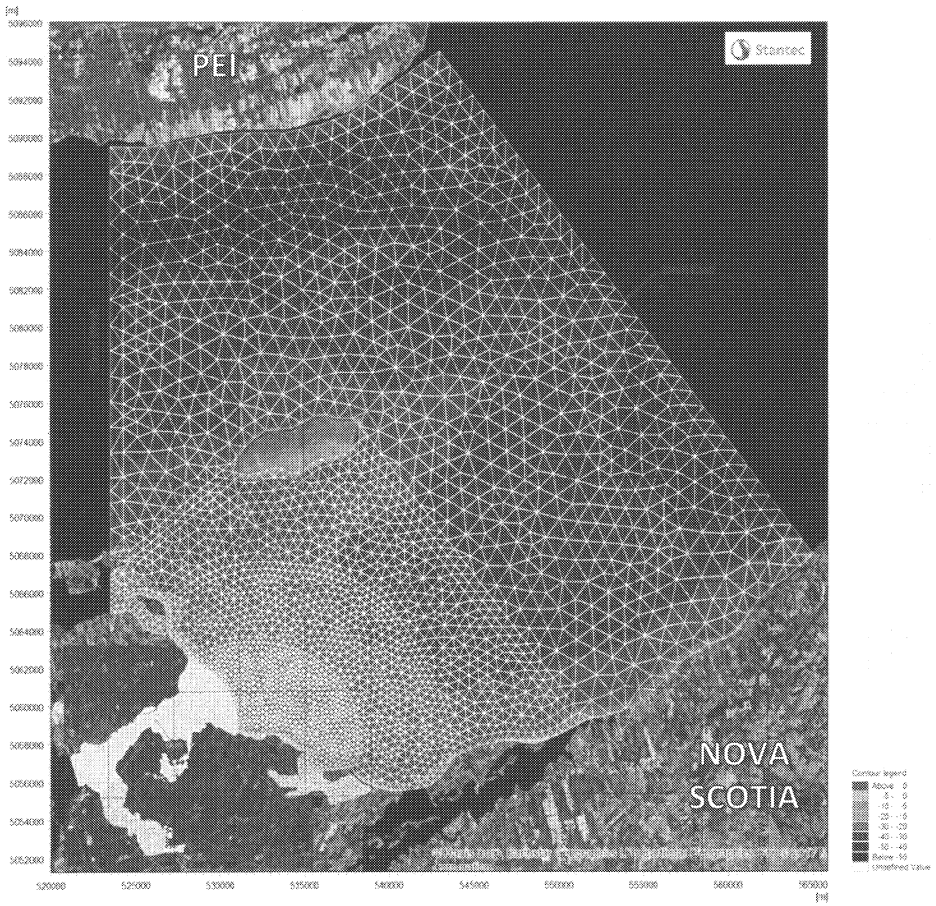
TSS at the end of a biological treatment process is > 98% biodegradable organic material.



TSS - measure of solids in effluent
TSS is regulated by Environment Canada under PPER

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RECEIVING WATER STUDY
LOCATING THE MARINE OUTFALL



A series of models were created to evaluate the flow dynamics, dispersal rates, settling rates, water chemistry and temperature profiles of the effluent discharge location options. The study area is shown above.

Modeling was completed to identify the potential area for the outfall, and the route the pipeline would take to get there.

There are a lot of constraints – things that need to avoid - including available commercial, recreational, and Aboriginal fisheries sensitivities, bird and shoreline sensitives, and other socio-economic sensitivities.

We've identified a solution we believe balances these constraints.

A key consideration, in consultation with Pictou Landing First Nation, was to develop a solution that does not impact Boat Harbour in the future tidal state.

Studies have shown that if the outfall was inside Pictou Harbour the slow currents and other environmental factors inside the Harbour could result in eutrophication. Eutrophication is the creation of conditions that stimulate the growth of plants and algae that will consume oxygen in the water which will harm aquatic species.

The Northumberland Strait was identified as the outfall location. In this dynamic location, modelling predicts there will not be an accumulation of nutrients.

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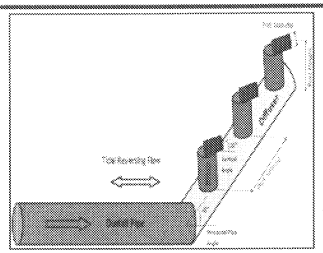
OUTFALL DESIGN : MULTI-PORT DIFFUSER

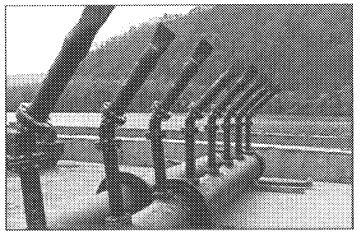
Once the effluent is treated on the mill site in the ETF, a pipeline will carry the treated effluent to the outfall location.

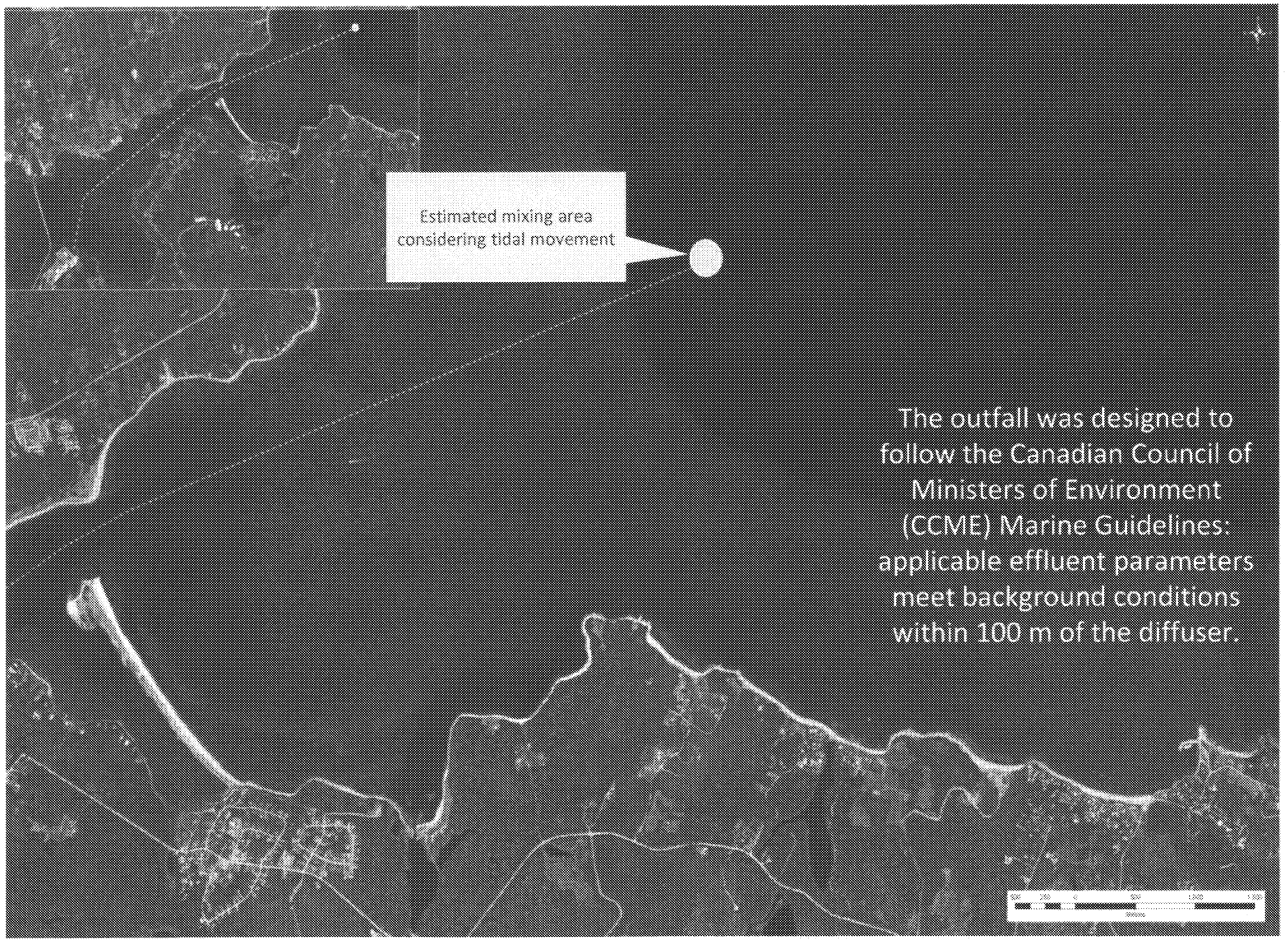
Based on the design completed to date:

- The outfall will be a six-port diffuser
  - Selected for better mixing and therefore less potential for environmental impact.
- The pipeline will be approximately a 36" diameter pipe made out of high density poly-ethylene (HDPE) material.
  - HDPE is strong and has some flexibility to allow for the undulating ocean bottom profile.
- A rock mattress will be placed under the outfall pipeline on the bottom of Pictou Harbour, and then covered in armour-stone for protective cover.

Example illustrations of a multi-port diffuser





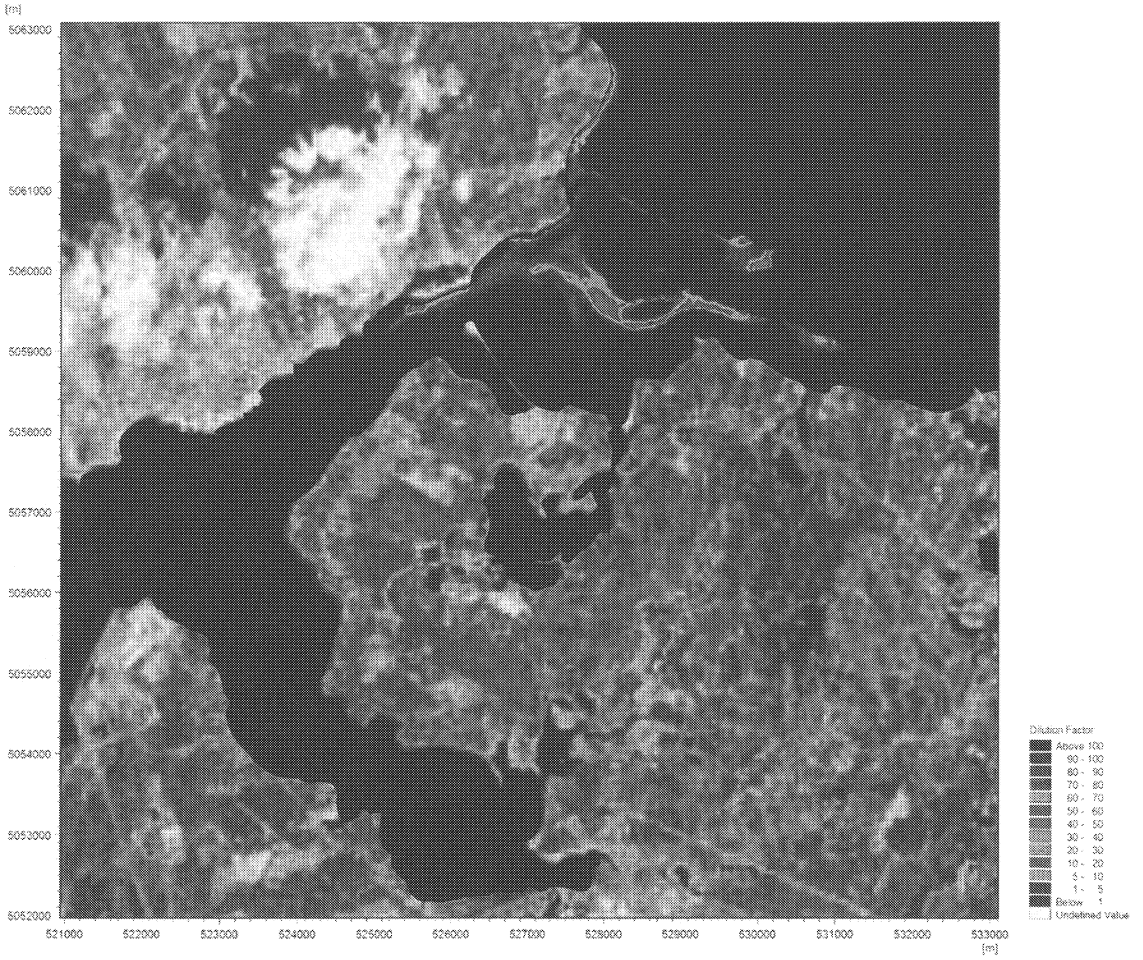


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2D. MODELING RESULTS

Current Circulation and Effluent Dispersion for Discharge from Alternative-D Outfall Location

Spatial Distribution of Simulated Effluent Dilution Factor at Time by End of One Month Simulation Period



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DESIGN CONSIDERATIONS IN NEW AST FACILITY: ODOUR CONTROL

TREATMENT PROCESS STAGE	CURRENT FACILITY	PROPOSED AST FACILITY
Primary Clarification	Large settling ponds, where solids settle over time and decompose under anaerobic conditions, generating hydrogen sulfide, hence creating odour similar to rotten eggs.	Solids removal is done on a continuous basis. Solids residence time is less than one day: this leaves little time for septic conditions to be created
Effluent Cooling	Effluent is cooled by the action of the surface aerators that throw the effluent into the air to allow it to absorb oxygen. This action also allows sulphur compounds to be released to the atmosphere by volatilization.	Uses indirect cooling (where cooling water is used to cool the effluent without coming into contact with it). Effluent cooling therefore occurs while the effluent is fully contained: no odours can be generated from this step of the process
Treatment Process	Solids decompose at the bottom of the ASB lagoon, which can create odours. Aeration is provided by surface aerators, which spray effluent in the air to bring it in contact with oxygen and, because of this, potentially release odorous compounds to the air through vapourization.	Solids are removed continuously and never allowed to settle within the basin. The aeration system selected is a combination of subsurface mixers and air injection (fine bubble diffuser). This system, combined with a sub-surface feed of the cooled effluent, minimizes the potential to volatilize odorous compounds
Sludge Handling	Sludge removal from the settling ponds and ASB lagoon occurs periodically as sludge inventories dictate.	The secondary clarifiers remove sludge continuously to prevent sludge accumulation that could lead to septic conditions. The dewatered solids will be collected and mixed in with existing biomass and burned in the Power Boiler.
		IMPROVED ODOUR CONTROL

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PREDICTED CONCENTRATIONS OF EFFLUENT IN THE NORTHTHUMBERLAND STRAIT

Parameter	What is it?	What types of effects could the parameter cause?	Predicted distance (Stantec 2017) from diffuser to meet water criteria:
Total Nitrogen (TN)	A nutrient.	Large concentrations in the nearshore can cause excessive algae growth (algae blooms), which can limit the amount of oxygen in the local area.	Within 2 metres - meets background (Pictou Road)
Total Phosphorus (TP)	A nutrient.	Large concentrations in the nearshore can cause excessive algae growth (algae blooms), which can limit the amount of oxygen in the local area.	Within 2 metres - meets background (Pictou Road)
Colour	Measures the colour of water.	Aesthetic consideration for humans. Potential visibility issue for fish if extensive.	Within 40 metres - meets background (Pictou Road)
Adsorbable Organic Halides (AOX)	AOX is a parameter group that encompasses organic halogen compounds from simple volatile substances such as chloroform, to complex organic molecules such as dioxins/furans (in trace amounts).	High AOX levels may have variable effects depending on the specific chemicals that comprise AOX and their levels in water.	Background data not available. Within 2 metres – well below World Bank guideline for pulp mills.
Total Suspended Solids (TSS)	TSS describes the amount of solids (clay, sand, silt, organic matter and particulates) that are suspended in water.	High TSS can affect dissolved oxygen (DO) levels or long term exposure to elevated levels may affect marine species.	Within 2 metres - meets CCME Marine Aquatic Life Guidelines (long term and short term exposure)
pH	pH indicates if a water body is acidic (low pH) or basic (high pH).	Although changes in pH can cause a variety of effects, the ocean will rapidly neutralize the effects of pH changes.	Within 5 metres – meets background (Pictou Road)
Biochemical Oxygen Demand (BOD5)	BOD measures the amount of oxygen used to decompose organic materials.	High BOD can reduce dissolved oxygen (DO) levels and may affect marine species.	Background data not available. Within 100 metres – meets levels typical of nearshore waters
Dissolved Oxygen (DO)	Amount of oxygen dissolved in the water.	Low levels of dissolved oxygen may mean there is less available oxygen for marine species to use.	Within 100 metres – meets background (Pictou Road)
Chemical Oxygen Demand (COD)	Amount of oxygen required or used by chemical reactions within the water. Required to breakdown organic and some inorganic material.	High COD may reduced dissolved oxygen (DO) and may affect marine species.	Background data not available. Within 100 metres – well below levels considered unpolluted by UNESCO
Water Temperature	How hot or cold the water is.	Marine life require a specific range of temperatures.	Within 8 m - meets CCME Marine Aquatic Life Guidelines of +/-1°C
Salinity	Salt content of the water.	Marine life require a specific range of salinity.	Within 100 m – meets background (Pictou Road)

Results from *Preliminary Receiving Water Study for Northern Pulp Effluent Treatment Plant Replacement, Pictou Harbour, Nova Scotia. 2017. Final Reports Stantec 2017.*

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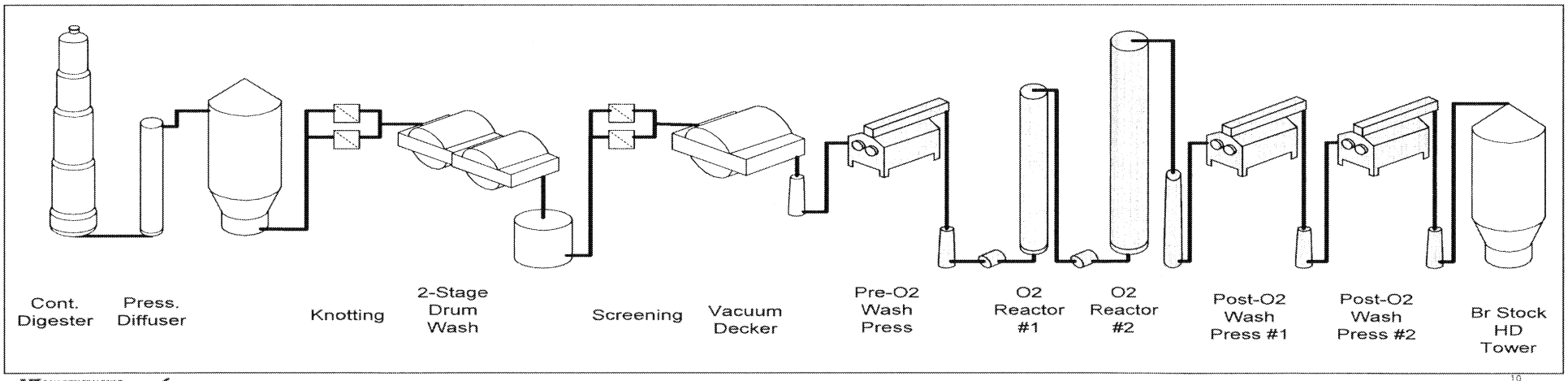
IN MILL PROJECTS TO SUPPORT EFFLUENT TREATMENT FACILITY (ETF)

Oxygen Delignification:

- First stage of bleaching – "Oxygen Bleaching"
- Sits between Brown Stock and Bleach Plant

Oxygen Delignification benefits:

- Reduces CLO_2 bleach chemicals by 30 – 40% - corresponding reduction in effluent organic loading for BOD, COD and AOX
- Reduces effluent color
- Reduces wood losses
- Increases liquor recovery – reduction in carbon footprint
- Reduces energy consumption by reducing aeration requirements in the new ETF – reduction in carbon footprint
- Reduces nutrient addition in the new ETF

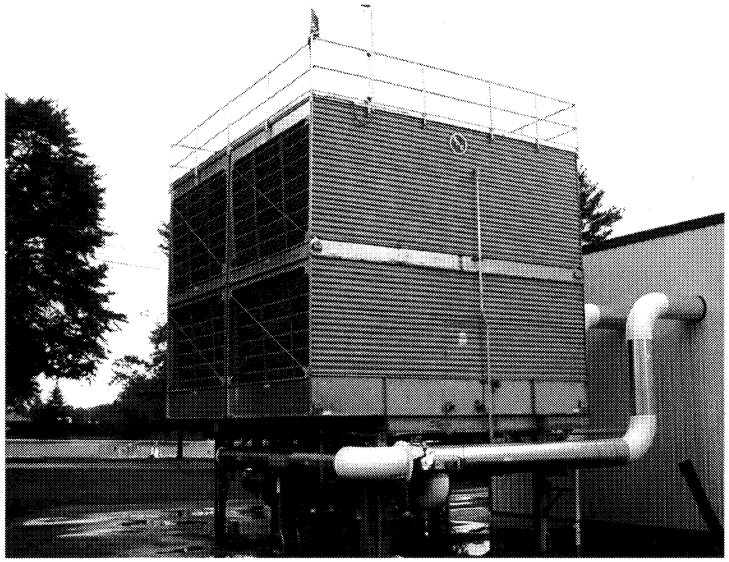


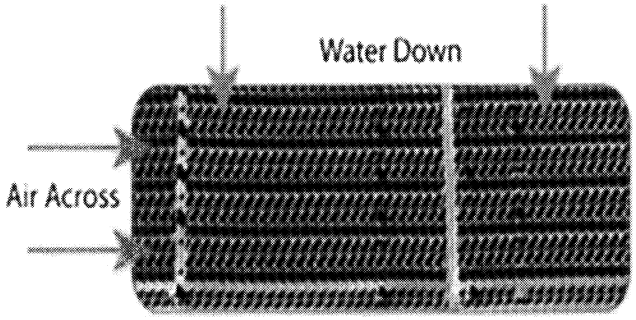
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IN MILL PROJECTS TO SUPPORT ETF (CON`T)

Cooling Towers for Summer Water Reduction

- ETF design is 85,000 m3/day
- Current annual average is < 70,000 m3/day
- Peak summer (July, August, September) has higher flows > 90,000 m3/day
- Need to run cooling towers in summer months to recycle cooling water (reduce temperature impact of turbine condenser)

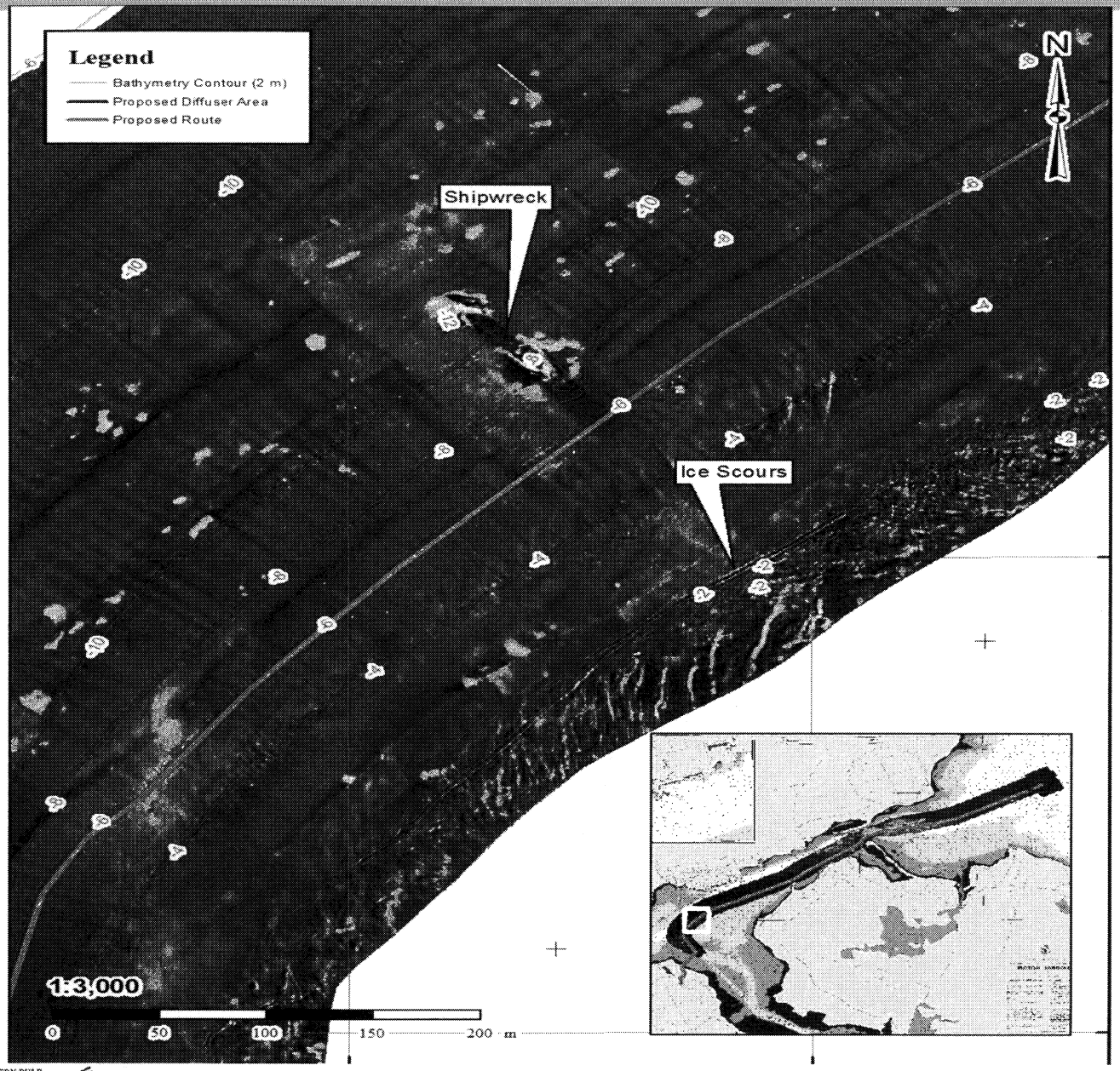




Fresh water trickles down the medium, as air is blown across. Cooling occurs through evaporation.

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MARINE SIDESCAN SONAR FINDINGS

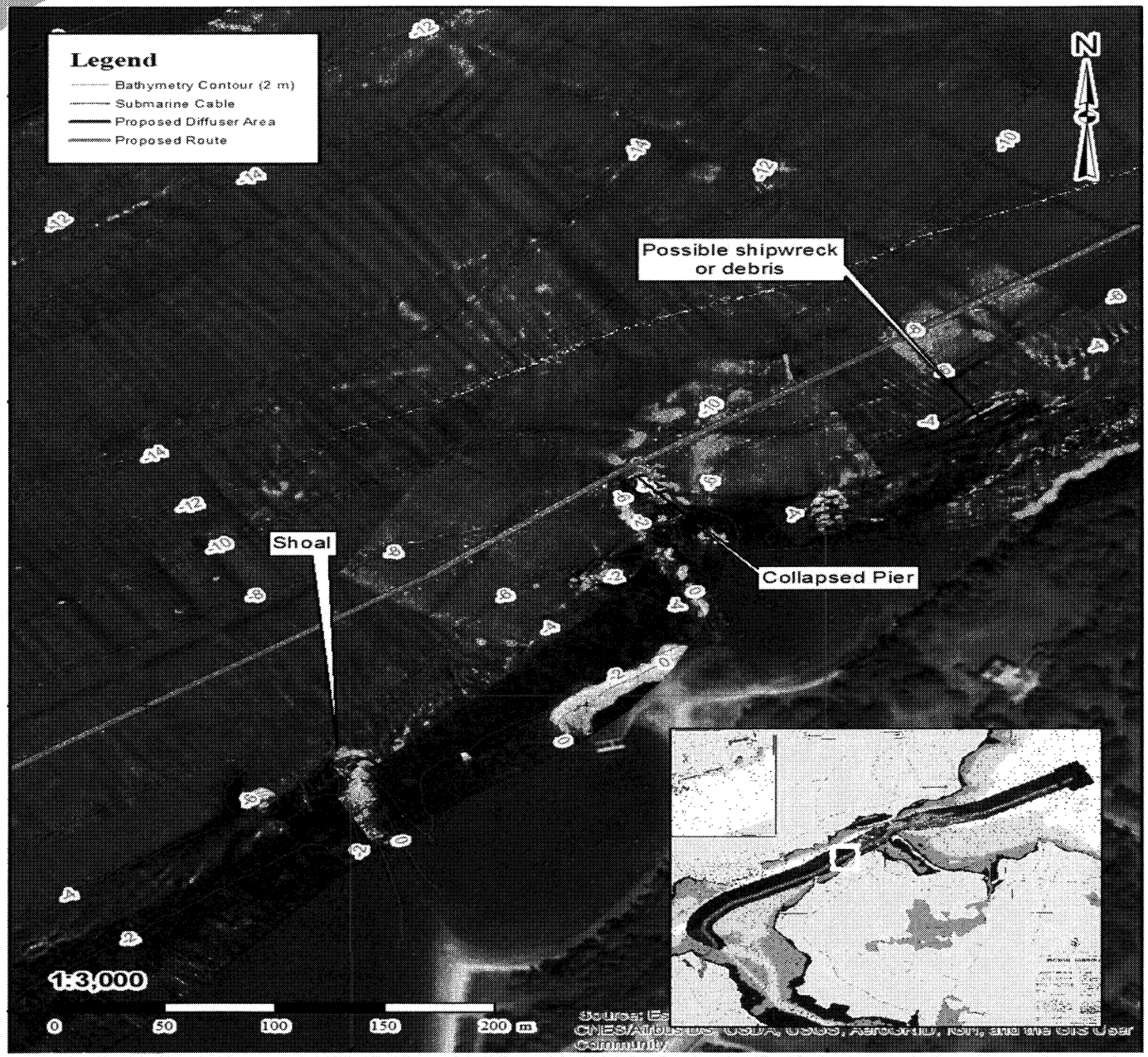


Sidescan sonar data showing a shipwreck, and ice scours near the proposed pipeline route

NORTHERN PULP NOVA SCOTIA CORPORATION
A PAPER EXCELLENCE COMPANY
DILLON

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MARINE SIDESCAN SONAR FINDINGS (CON`T)

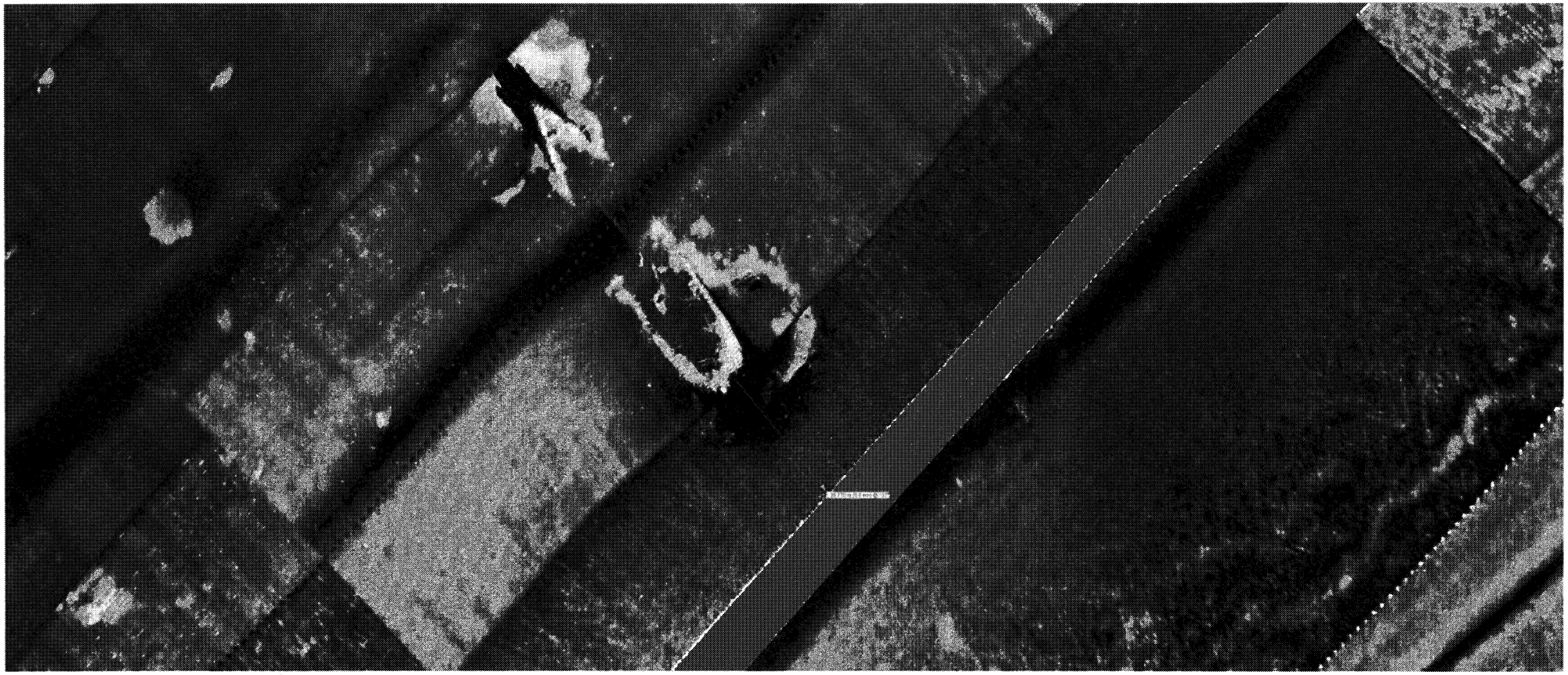


Sidescan sonar data showing collapsed pier, a shoal, and potential shipwreck/debris near the proposed pipeline route

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MARINE SIDESCAN SONAR FINDINGS (CON`T)

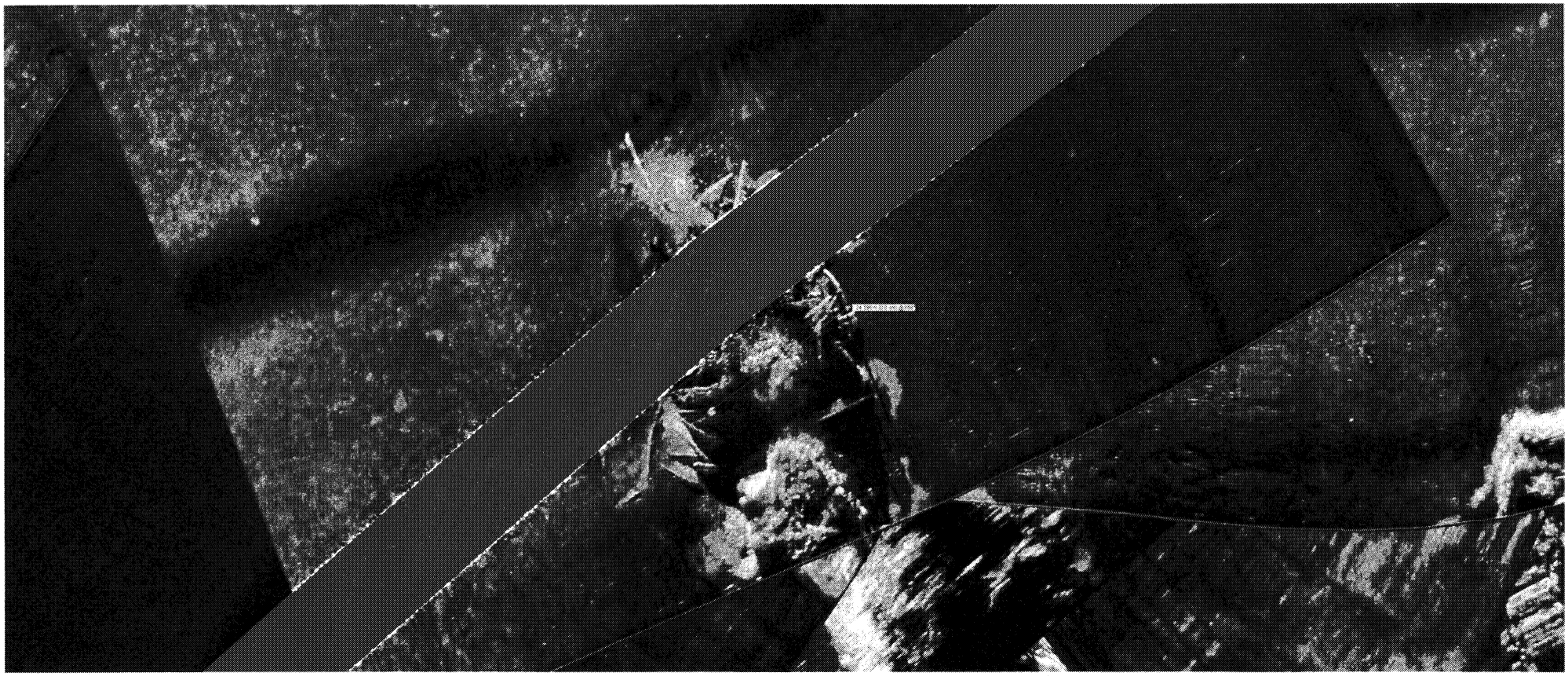
Pipeline route and shipwreck



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MARINE SIDESCAN SONAR FINDINGS (CON`T)

Pipeline route crossing collapsed pier



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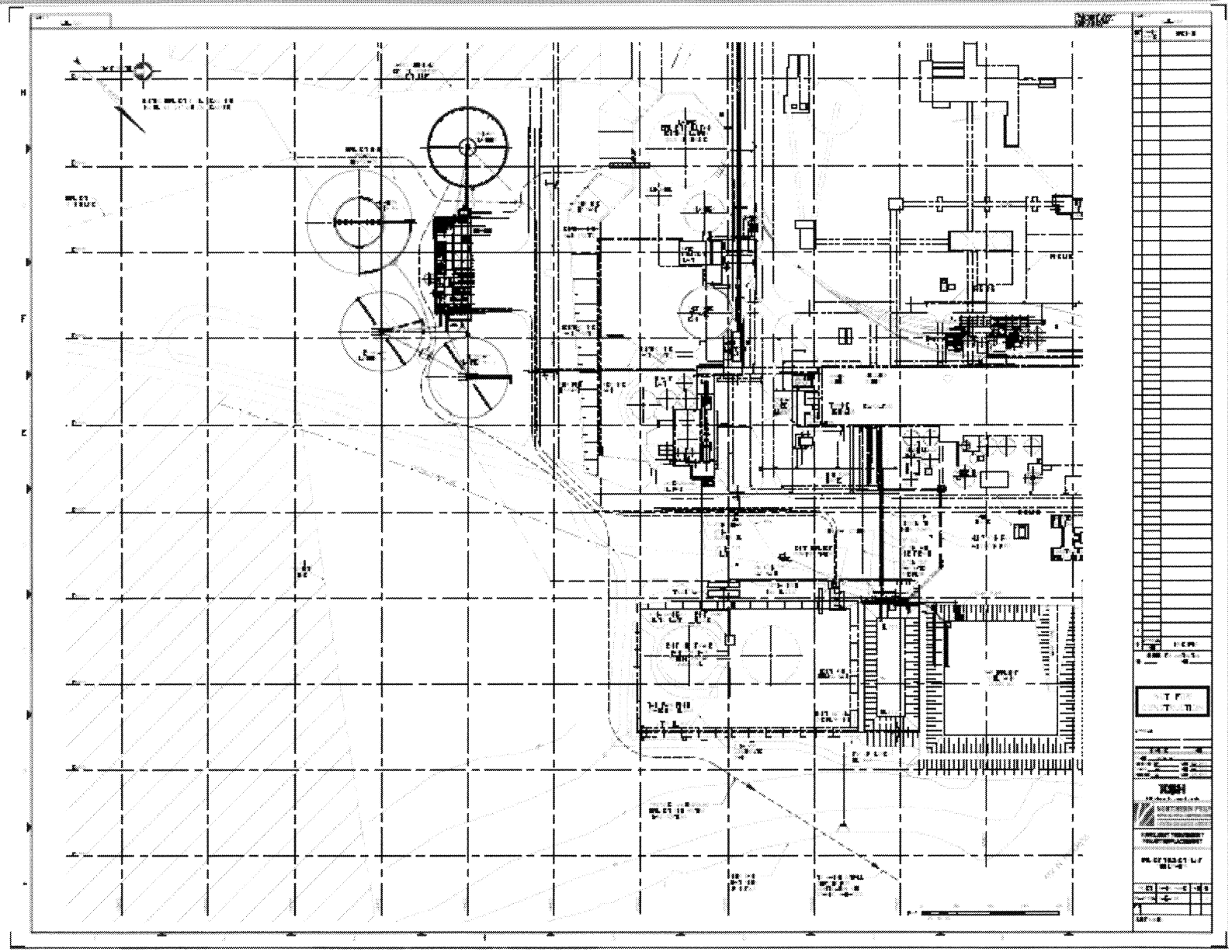
MARINE SIDESCAN SONAR FINDINGS (CON`T)

Ice scours in harbour



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EFFLUENT TREATMENT FACILITY DESIGN



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Stakeholder Engagement Sessions

Throughout the pre-registration process the project team has interacted with key and concerned stakeholders (local government, First Nations, fishery groups) in order to build trust and to obtain important information to help guide the final design of the treatment facility, particularly the offshore components.

- Fishers - December 4 & 21, 2017
- Local Politicians Engagement - December 5 & 6, 2017
- Local Business, Forestry Suppliers -December 5 & 6, 2017
- Community Public Information Centre – December 5 & 6, 2017
- PLFN (Fishers and Community) – January 8, 2018
- Native Council of Nova Scotia – January 10, 2018
- Fishers - February 8 & 20, 2018
- Prince Edward Island Legislature Committee – February 15, 2018
- Progressive Conservative Caucus October 15, 2017
- NDP Caucus – January 24, 2018
- Nova Scotia Salmon Association – April 9 , 2018
- Community Public Information Centre – June 2018

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IDENTIFIED STUDIES & STATUS

Alternatives Assessments

- Market study - complete
- Alternative treatment processes - complete
- Alternative disposal options - complete

Detailed List of Terrestrial Environment Studies & Status

- Late plant survey - complete
- Early plant survey - pending
- Winter and early spring bird survey – complete
- Breeding bird survey - pending
- Preliminary wetland - complete
- Wetland functional assessment - pending
- Turtle/herptile assessment - pending
- *Terrestrial wildlife, migratory bird, and bird - priority species/habitat
- *groundwater, bedrock, surficial geology

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IDENTIFIED STUDIES & STATUS (CON`T)

Detailed list of Aquatic Environment Studies & Status

- Harbour and marine habitat visual assessment – in progress
- Final receiving water study - pending
- Final predicted mixing zone characteristics – in progress (draft completed)
- Final predicted impact to benthic environment – in progress (draft completed)
- Future baseline sampling for aquatic environment - pending
- Future monitoring via EEM program - pending
- Sediment testing of harbour and marine bottom to review potential contamination – in progress
- *Aquatic/marine fish and wildlife species- priority species/habitat

Engineering Studies / Design

- Completion of sonar to assess potential for ice scour and therefore damage to system – in progress
- Geotechnical - in progress
- Route – in progress
- Footprint of armour stone – in progress
- Alteration of dry pond to avoid identified archaeological resources – in progress
- Design of access road / tree impact – in progress
- Final confirmation of outlet location, diffuser footprint and orientation – in progress

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IDENTIFIED STUDIES & STATUS (CON`T)

Human Health, Socio-Economic and Cultural

- MEKS - in progress
- Archaeological and cultural heritage (land based) - complete
- Marine archaeological and cultural heritage - in progress
- Air Quality – in progress
- Risk based assessment of Human Health – in progress
- Noise – In progress
- *summary of engagement with stakeholders, government and public
- *summary of engagement with Indigenous Peoples
- *Indigenous Peoples potential impact (as described in CEAA document, addressed in other VECs)

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Questions?

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Smith, Colleen A

From: Cloutier, Kathy <Kathy.Cloutier@northernpulp.com>
Sent: June-06-18 5:13 PM
To: Bowen, Lynn A; MacPhail, Helen; Keats, Paul J; Furey, Stefan M; Higgins, Jeremy W; Check, Gordon G; Grant, MT (EC; Zwicker, Stephen (EC; Smith, Colleen A; Flanagan, Jason; Denning, Allison (HC/SC; Maclean,Lachlan [CEAA; Yeh, Helen X; Burgess, Annamarie; sdevereaux@dillon.ca; March, Karen
Cc: Jean Francois Guillot; Fraser, Terri; Chapman, Bruce; VanSickle, Debbie
Subject: Northern Pulp Effluent Treatment Facility - May 31 project update

Greetings,

For your convenience, please find below a brief overview of topics and key points discussed at the Effluent Treatment Facility (ETF) Replacement Project update held Thursday May 31, organized by Helen.

Marine Sidescan Sonar Findings:

- Data showing collapsed pier, a shoal, and potential shipwreck/debris
- Data showing ice scour
- In light of findings to-date, further due diligence required in understanding proposed route; additional investigation currently underway

Public and Stakeholder Engagement, Project Registration:

- Project Registration anticipated Summer 2018
- Registration Project Approval to Proceed determines heightened potential for winter construction leading to increased cost and possible related difficulties
- Extensive pre-registration period covering over 210 days (Winter 2017 – Summer 2018)
- Throughout the pre-registration process the project team has interacted with public, key and concerned stakeholders (government, First Nations, fishery groups)

Existing Effluent:

- Plume exists currently within Pictou Road area of proposed discharge outfall location
- Historical improvements have been made with regards to organic loading in effluent
- Northern Pulp currently operates well under the PPER limit for BOD
- Historical improvements were made at NPNS regarding solids loading in effluent
- NPNS currently operates well under the PPER limit for TSS
- Solids loading will be similar to the current discharge of the ASB into the Boat Harbour basin and remain well below PPER limits
- TSS at the end of a biological treatment process is > 98% biodegradable organic material

In-Mill projects to support the ETF:
Oxygen Delignification (O2 delig) -- $70 million project which…

- Reduces ClO_2 bleach chemicals by 30 – 40% - corresponding reduction in effluent organic loading for BOD, COD and AOX
- Reduces effluent color
- Reduces wood losses
- Increases liquor recovery – reduction in carbon footprint

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- Reduces energy consumption by reducing aeration requirements in the new ETF – reduction in carbon footprint
- Reduces nutrient addition in the new ETF

Cooling Towers for Summer Water Reduction -- $5 million project

- ETF design is 85,000 m3/day
- Current annual average is < 70,000 m3/day

Studies:

- Detailed List of Terrestrial Environment Studies
- Alternatives Assessments
- Detailed list of Aquatic Environment Studies
- Engineering Studies / Design
- Human Health, Socio-Economic and Cultural

On behalf of Paper Excellence, Northern Pulp and Dillon Consulting ETF project team members, I would like to thank each of you for participating.
Should you have any questions or concerns, please do not hesitate to contact me.

Kindly,
Kathy

Kathy Cloutier
Director of Communications
P: (902) 752-8461 231
C: [redacted]

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www.paperexcellence.com

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s.19(1)
s.20(1)(b)
s.20(1)(c)

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Smith, Colleen A

From: Burgess, Annamarie <aburgess@dillon.ca>
Sent: June-08-18 2:43 PM
To: Smith, Colleen A; Jalloh, Rugi; Wambolt, Michael; March, Karen
Subject: NPNS Weekly Update

Good afternoon Colleen,

An update for advance marine being completed for the NPNS EA and design work:

CSR has finished the sidescan collection yesterday. They are planning to begin mobilizing for the [redacted] (geotechnical) work mid next week. Samples can be advanced in the areas where the route has less flexibility and move in tandem as the designer finishes the route and diffuser design.

Have a great weekend.
Cheers,
Annamarie

Annamarie Burgess, LPP, MCIP, P.Eng.
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
Halifax, Nova Scotia, B3S 1B3
T - [redacted]
F - 902.450.2008
M - [redacted]
ABurgess@dillon.ca
www.dillon.ca

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Smith, Colleen A

From: Smith, Colleen A
Sent: September-25-18 1:11 PM
To: Fraser, Terri
Subject: RE: Update on Northern Pulp EA

Hi Terry,

It has been a couple months since we last received an update on the Northern Pulp and Paper EA and Regulatory Processes. Would you be able to provide us with a status update?

Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management
Fisheries and Oceans Canada
PO Box 1006, Dartmouth, NS B2Y 4A2
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Fraser, Terri [mailto:terri.fraser@northernpulp.com]
Sent: June-27-18 11:00 AM
To: Helen.Yeh@novascotia.ca; mt.grant@canada.ca; michael.hingston@canada.ca; Mark.Elderkin@novascotia.ca; Jalloh, Rugi; Smith, Colleen A; Helen.MacPhail@novascotia.ca; Lachlan.Maclean@ceaa-acee.gc.ca; Lynn.Bowen@novascotia.ca; Stefan.Furey@novascotia.ca; Jeremy.Higgins@novascotia.ca; Gordon.Check@novascotia.ca; stephen.zwicker@canada.ca; jason.flanagan@tc.gc.ca; allison.denning@canada.ca; Lewis, Beth J; Dera, Beata E
Cc: Cloutier, Kathy; Wilson, Michael; VanSickle, Debbie; sdevereaux@dillon.ca; Annamarie Burgess; March, Karen
Subject: Update on Northern Pulp EA

Hello All,

Further to our meeting of May 31, and appreciating that the summer vacation season is upon us, I would like to provide an update with respect to Northern Pulp's EA filing.

At our last meeting NPNS highlighted that further due diligence is required in understanding the unforeseen underwater findings that will lead to alterations in the final effluent line routing. Based on what has been found, we need to engage with our pipeline designer to evaluate and update the routing before we begin the geotechnical coring and marine habitat video portion of the work. We have temporarily stepped back and halted CSR's work in the water pending review by the designers. We anticipate that more information gathering will be necessary before the coring and video steps can proceed.

This revised approach will be EA schedule impacting. We do not foresee a submission during the months of July and August. We will provide an update to the group when more clarity is available with regards to scheduling of the required activities.

Helen – I tried to capture all the regulators, but please feel free to forward if I have inadvertently missed someone.

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Best Regards,

Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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s.19(1)

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Jalloh, Rugi

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: October-01-18 3:07 PM
To: Helen.Yeh@novascotia.ca; mt.grant@canada.ca; michael.hingston@canada.ca; Mark.Elderkin@novascotia.ca; Jalloh, Rugi; Smith, Colleen A; Helen.MacPhail@novascotia.ca; Lachlan.Maclean@ceaa-acee.gc.ca; Lynn.Bowen@novascotia.ca; Stefan.Furey@novascotia.ca; Jeremy.Higgins@novascotia.ca; Gordon.Check@novascotia.ca; stephen.zwicker@canada.ca; jason.flanagan@tc.gc.ca; allison.denning@canada.ca; Lewis, Beth J; Dera, Beata E
Cc: Wilson, Michael; VanSickle, Debbie; sdevereaux@dillon.ca; Annamarie Burgess; March, Karen; Kathy Cloutier
Subject: RE: Update on Northern Pulp EA

Hello,

Hope you all had a great summer. I appreciate you are all anxious for a project update from NPNS. We have been working through many engineering and design details for the ETF project. I would like to share more details with you shortly, but there are still a few loose ends to tie up. We would be happy to participate in another round table discussion with regulators in the near future. I will be reaching out in the next few weeks to set something up.

Best Regards,

Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461

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www.paperexcellence.com

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s.14(a)
s.21(1)(b)

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Notes for PATH

October 2, 2018 at 2Pm

Aboriginal communications and Environmental Assessment

DFO-FPP called a meeting via conference to discuss any updates in terms roles and responsibilities, Indigenous consultation & EA processes; and any other updates. Regulators that were invited include CEAA (Lachlan MacLean, Betty Cougle & Melanie Smith); TC (Jason Flanagan & Jennifer Daigle); DFO (Mike Wambolt, Colleen Smith & Rugi Jalloh).

Updates:

DFO indicated that nothing has changed on their end and still awaiting final designs of the route of the pipe, methodology of the construction, and habitat type in order to review the physical aspects of the construction of the pipe and outfall. DFO will make a determination under the *Fisheries Act* once the outstanding information is reviewed. DFO indicated that they should be included in any meetings or correspondence with Indigenous Groups and the proponent until a decision is made on the issuance of a *Fisheries Act* Authorization.

[redacted] TC also clarified that they will scope the route of the pipe but not the fate of the effluent. TC mentioned that they will refer to the Provincial EA, which will cover off the Federal CEAA 2012, Section 67 requirements.

Although ECCC will not be issuing a permit or approval, they will review the EA reports and provide expert advice.

CEAA is also awaiting final designs of the route of the pipe and updated modelling prior to making a determination regarding the Federal EA designation. If the project is designated; CEAA may take the lead role in the coordination of both the EA and Indigenous consultation processes.

NSTIR (the Province) has initiated Indigenous consultation and, TC, DFO and CEAA are remaining engaged in the process. Both Jennifer from TC, and Betty from CEAA, confirmed that the Province only consults with KMKNO under the Terms of Reference, Millbrook, and Sipekne'katik First Nations. The Province does not consult with the Native Council of Nova Scotia. Pictou Landing First Nations have been involved in the consultation process to a large extent.

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Smith, Colleen A

From: Smith, Colleen A
Sent: October-03-18 1:58 PM
To: Yeh, Helen X; 'betty.cougle@canada.ca'
Cc: Lewis, Beth J
Subject: RE: NPNS ETF Continued Consultation Letter to PLFN
Attachments: NSE to PLFN *consultation ltr_2018Oct01_DFO (2).doc*

Hi Helen,

Please see DFO changes in the attached document.

Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Yeh, Helen X [mailto:Helen.Yeh@novascotia.ca]
Sent: October-03-18 10:09 AM
To: 'betty.cougle@canada.ca'; Smith, Colleen A
Cc: Lewis, Beth J
Subject: RE: NPNS ETF Continued Consultation Letter to PLFN

Hi Betty and Colleen,

As requested, attached is the letter to PLFN regarding the effluent treatment plant.

Please let me know if you have any comments relevant to your department (high-lighted in YELLOW) by end of today. Sorry for the short turnaround as I plan to send out the letter today so I could provide PLFN as much time as possible fort their inputs before EA is submitted.

Thanks,

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8

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Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: Lewis, Beth J
Sent: Wednesday, October 03, 2018 8:58 AM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Dera, Beata E <Beata.Dera@novascotia.ca>
Subject: NPNS ETF Continued Consultation Letter to PLFN

Hi Helen,

Can you send the most recent draft of the letter to me? Betty from CEAA and Colleen Smith from DFO would like to review. Either you can send to me and I'll coordinate their review/comments, or feel free to send it directly and cc me.

Thanks,
Beth

Betty Cougle: betty.cougle@canada.ca
Colleen Smith: Colleen.Smith@dfo-mpo.gc.ca

Beth Lewis
Consultation Advisor
Nova Scotia Office of Aboriginal Affairs
P. (902) 424-8088 F. (902) 424-4225 C. [redacted]
beth.lewis@novascotia.ca

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NOVA SCOTIA Environment

PO Box 442
Halifax, Nova Scotia
B3J 2P8

Tel: (902) 717-1073
Fax: (902) 424-6925

October 3, 2018.

Chief Andrea Paul
Pictou Landing First Nation
43 Maple Street
RR# 2, Box55, Site 6
Trenton, Nova Scotia B0K 1X0

Dear Chief and Council:

RE: Continuing Consultation on the Effluent Treatment Facility Proposed by Northern Pulp Nova Scotia Corporation

I am writing to provide an update on the new effluent treatment facility (ETF or the project) proposed by Northern Pulp Nova Scotia Corporation (NPNS) and follow up on the consultation meeting held with Pictou Landing Chief and Council on June 11, 2018.

The purpose of this letter is to continue consultation on this project with the Mi'kmaq of Nova Scotia under the August 31, 2010 Mi'kmaq-Nova Scotia-Canada Consultation Terms of Reference, and to provide information about:

1. Proposed changes to the project;
2. Regulatory requirements;
3. Consultation with the Mi'kmaq of Nova Scotia.

Proposed Changes to the Project

As presented at our June 11, 2018 consultation meeting, ice scour, a shipwreck, and a collapsed pier have caused NPNS to reconsider the location of the proposed effluent pipeline located in Pictou Harbour. During that meeting, NPNS presented information and maps that showed the locations of these obstacles. At this time, it is our understanding that more investigation is required to inform the resulting changes to the pipeline design. The final design and location of the pipeline will be shared with Pictou Landing First Nation (PLFN) via the environmental assessment process.

We have been informed by NPNS that changes to the design and location of the pipeline will result in a change in location of the outfall and diffuser. The final location of the outfall/diffuser has not yet been determined because the final location of the pipeline has not yet been determined.

Regulatory Requirements

Below is an update on the status of all the anticipated provincial and federal authorizations.

Nova Scotia Environment

A provincial environmental assessment is expected to be submitted in Fall 2018, and the timing of this submission is entirely dependent upon NPNS.

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Canadian Environmental Assessment Agency
The decision regarding the requirement of a federal Environmental Assessment is pending and is being evaluated by the Canadian Environmental Assessment Agency.

Transport Canada
Transport Canada may require an approval under Section 6 or a permission under Section 9 of the *Navigation Protection Act* to assess the potential impact of works, undertakings or activities associated with the project that may interfere with the navigation of vessels. A license under Section 71(1) of the *Canada Marine Act may* also be required.

Fisheries and Oceans Canada (DFO)
Pursuant to Section 35 of the *Fisheries Act*, DFO will review the works, undertakings or activities associated with the physical impacts from the construction of the proposed effluent pipeline and may require a *Fisheries Act* Authorization for the potential serious harm to fish.

Consultation with the Mi'kmaq of Nova Scotia
At the June 11, 2018 consultation meeting, PLFN requested a status overview of all the reports, studies and other documents associated with the consultation to date. The status overview was shared with PLFN on June 27, 2018 and is also attached to this letter for your reference. As an update to that memo, the Archeological Shovel Testing Report has recently been approved and is attached to this letter for your review.

Previously, all reports and studies associated with the consultation that are available to be shared at this point, have been shared with PLFN either through the NPNS ETF website, via email, via mail, or in-person during formal consultation meetings. Below is a list of the four completed reports that have been shared previously with PLFN, the fifth being the Archeological Shovel Testing Report shared with this correspondence. All five reports are attached to this letter for your reference.

1. Global Market Study
2. Technology Selection Summary Report
3. Middle River Water Availability
4. Preliminary Receiving Water Study
5. Archeological Shovel Testing Report

NPNS has informed us that remaining reports are either still in progress or they will be shared with PLFN via the environmental assessment process. The Province has encouraged NPNS to provide PLFN as much information as possible in advance of the environmental assessment process.

Please note that the lead department for Aboriginal consultation is subject to change as the approval process evolves. As it is expected, the project will be registering for a provincial environmental assessment in the coming months, therefore the consultation lead has shifted from the Department of Transportation and Infrastructure Renewal to Nova Scotia Environment.

As part of the continuing consultation, we would like to hear from the Mi'kmaq of Nova Scotia about any concerns you may have, including the details of any asserted Aboriginal or Treaty rights that could be adversely impacted by this project. Please provide a response by October 31, 2018.

Sincerely,

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Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment

Encl.

Cc.

Twila Gaudet
Kwilmu'kw Maw'klusuaqn Negotiation Office

Beata Dera
Nova Scotia Office of Aboriginal Affairs

Beth Lewis
Nova Scotia Office of Aboriginal Affairs

Lynn Bowen
Nova Scotia Environment

Royden Trainor
Nova Scotia Transportation and Infrastructure Renewal

Betty Cougle
Canadian Environmental Assessment Agency

Jennifer Daigle
Transport Canada

Mike Wambolt
Department of Fisheries and Oceans

Michael Hingston
Environment and Climate Change Canada

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Smith, Colleen A

From: Lewis, Beth J <Beth.Lewis@novascotia.ca>
Sent: October-05-18 12:13 PM
To: Smith, Colleen A; Wambolt, Michael
Subject: RE: Consultation Meeting with PLFN: NPNS ETF

Hi Colleen and Michael,

For your information in preparation for the meeting, here is a list of the main issues/impacts to rights that have been raised by PLFN during the consultation to-date:

- ETF and pipeline construction impacts on fishing season.
- ETF and pipeline construction impacts on Pictou Harbour and Northumberland Strait sea bottom.
- Salinity levels of effluent at outfall site (Strait).
- Temperature levels of effluent at outfall site (Strait).
- Impacts of effluent on fish and habitat and, therefore, impacts on fishery.

Beth

From: Smith, Colleen A [mailto:Colleen.Smith@dfo-mpo.gc.ca]
Sent: Friday, October 05, 2018 10:39 AM
To: Lewis, Beth J <Beth.Lewis@novascotia.ca>
Cc: Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>
Subject: RE: Consultation Meeting with PLFN: NPNS ETF

Hi Beth,

You had the wrong email address for Michael Wambolt. His correct email is as Michael.Wambolt@dfo-mpo.gc.ca , he is copied on this email.

Thank you,
Colleen
Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Lewis, Beth J [mailto:Beth.Lewis@novascotia.ca]
Sent: October-05-18 9:00 AM
To: Yeh, Helen X; Dera, Beata E; Daigle, Jennifer; McLean, Mark G; Smith, Colleen A; wambolt.michael@dfo-mpo.gc.ca; Trainor, Royden; michael.hingston@canada.ca
Subject: Consultation Meeting with PLFN: NPNS ETF

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Hi All,

PLFN has requested a consultation meeting on the Northern Pulp Effluent Treatment Facility project. I've tentatively held October 22, 09:30am to 1:00pm at the request of Chief Andrea as a possible date. Please let me know as soon as possible if this date works for you.

I have not yet reached out to the proponent but I will when I have federal and provincial participants confirmed.

Thank you,
Beth

Beth Lewis
Consultation Advisor
Nova Scotia Office of Aboriginal Affairs
P. (902) 424-8088 F. (902) 424-4225 C. [redacted]
beth.lewis@novascotia.ca

s.19(1)

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Walters-MacPhee, Lenora

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: Tuesday, October 16, 2018 10:28 AM
To: Jalloh, Rugi
Cc: Davis, Dave; Wilson, Michael
Subject: RE: Meeting on Thursday, Oct 18
Attachments: NPNS_harbour_bottom_survey_plan_20181015.pdf

Attachment provided elsewhere.

Hi Rugi,

We have an updated design to speak to you about on Thursday. We have CSR going back in the water next week to perform additional survey work. I have attached the revised Stantec survey plan for your re-approval. I will provide a more detailed updated on Thursday as to the reason for the change in location and the path forward.

Best Regards,

Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461

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From: Jalloh, Rugi [mailto:Rugi.Jalloh@dfo-mpo.gc.ca]
Sent: Tuesday, October 16, 2018 9:07 AM
To: Fraser, Terri <terri.fraser@northernpulp.com>
Subject: Meeting on Thursday, Oct 18

Hello Terri,
I sent you an email but did not hear back from you. Is the underwater benthic survey complete or do have updated design? If so, it would be helpful if you can forward them to us as soon as you can.
Thanks,

Ms. Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
Fax/ téléc: 902-426-1489
1 Challenger Dr./1 promenade Challenger
P.O. Box/C.P. 1006, Station P410
Dartmouth, NS/NE B2Y 4A2

Pages 875 to / à 883

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pages 1164 to / à 1172

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Wambolt, Michael

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: October-18-18 1:01 PM
To: Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael
Subject: Fwd: Emailing: 1806 N Pulp Geotechnical Technical Proposal.pdf
Attachments: 1806 N Pulp Geotechnical Technical Proposal.pdf; ATT00001.htm

Hi,

The information regarding the equipment is shown in section 4 of the technical proposal.

Best Regards,
Terri

Begin forwarded message:

> **From:** "MacDougall, Hugh"
> **To:** "Fraser, Terri" <terri.fraser@northernpulp.com>
> **Subject: Emailing: 1806 N Pulp Geotechnical Technical Proposal.pdf**
>
> Your message is ready to be sent with the following file or link attachments:
>
> 1806 N Pulp Geotechnical Technical Proposal.pdf
>
> Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

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Confidential

TECHNICAL PROPOSAL

Marine Geotechnical/Harbour Bottom Video Investigation RFQ 10-1113-A000-003031

Submitted To

Bernard Chamberland, Project Manager, KSH
Guy Martin, Lead Process Engineer, KSH
And
Hugh MacDougall, Sr. Project Engineer Northern Pulp NS Corp.

Prepared by:

CSR GeoSurveys Ltd.
341 Myra Road, Porters Lake
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Telephone: 902-827-4200
Email: [redacted]

and

Stantec

Stantec Consulting Ltd.
Dartmouth NS

CSR Job Number: 1806

Date: March 7, 2018

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March 7, 2018

Bernard Chamberland, Project Manager, KSH
Guy Martin, Lead Process Engineer, KSH
Hugh MacDougall, Sr. Project Engineer Northern Pulp NS Corp.

RE: Northern Pulp Marine Geotechnical/Harbour Bottom Video Proposal

Dear Sirs,

Enclosed please find our technical response to the request for proposal for the above noted project. CSR GeoSurveys Ltd. (CSR) is an internationally recognized geophysical consulting company that specializes in high resolution marine geophysical and hydrographic surveys. We are currently in our 32nd year in business.

CSR GeoSurveys is pleased to Team together with Stantec on this project. We have a long history of successful joint projects that dates back to the early 1990's.

CSR has extensive experience conducting pipeline and cable geophysical route surveys around the world. Likewise, Stantec has a long history of Marine Geotechnics for marine structures as well as, Biological habitat and marine archeological expertise.

We look forward to working on this project should we be successful. For contractual purposes CSR is Prime Contractor and Stantec is our subcontractor.

We thank you for the opportunity to offer you this proposal and look forward to your positive consideration of CSR's services.

Please do not hesitate to call should you have any questions.

Sincerely,

Glen Gilbert, P.Geo.
President

In my absence please contact:
Patrick Campbell, P.Geo.
Vice President

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1.0 INTRODUCTION

Paper Excellence Canada is planning to replace the existing effluent treatment system at the Northern Pulp mill on Abercrombie Point, NS. The system will be replaced with a new wastewater treatment plant, including a new marine effluent outfall. To carry out this project, a marine geotechnical and harbour bottom video investigation of the proposed route for the new submerged effluent outfall within Pictou Harbour and the Northumberland Strait is required.

CSR GeoSurveys Ltd (CSR) in association with Stantec Consulting Ltd. (Stantec) is pleased to provide the following scope of work in support of our response to this RFQ. This response covers our proposed approach to address both the geotechnical pipeline engineering and marine biological habitat mapping components of this submission.

1.1 Commentary On Pipeline Routing Over Different Seabed Conditions

The siting criteria for a potential marine pipeline route often are based to a large degree on the geological analysis of the area.

Soft unconsolidated and possibly, gas rich sediments may offer poor foundation characteristics or could form a fluid backfill where the pipe is trenched. Sediments prone to liquefaction or other bearing strength failures should be avoided.

Areas with strong bottom currents or intense wave activity may be subject to scour or burial around the pipeline, either of which may be of negative impact on the pipeline. In particular, areas with large mobile sand bodies can create pipeline exposures and possibly spans.

In general, proximity to eroding, unstable shorelines or submarine slopes leading from those shorelines should be avoided. Slope instability due to cyclic wave loading can cause failures causing burial or lateral displacement of the pipe.

Sediments infilling buried channels are often ; unconsolidated, may exhibit slope instability features or may also contain trapped gas. Such variable foundation conditions may be prone to bearing strength failures causing spanning conditions.

Some aspects of pipe/soil interaction are shown by the following Figure 1.

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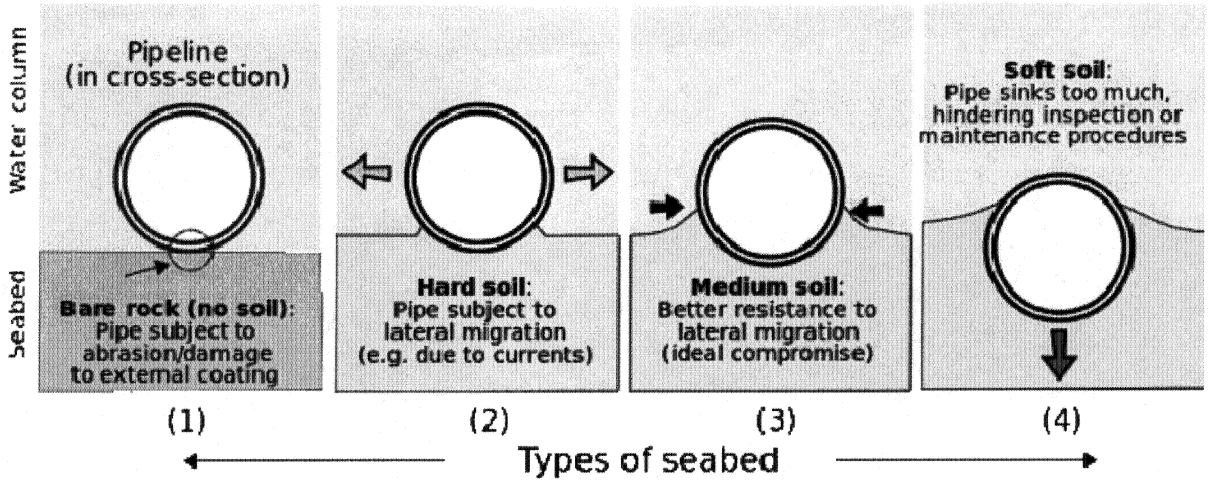


Figure 1; Some aspects of pipe/soil interaction

Due to the above factors it is very important to collect enough geophysical data of the surface and subbottom soil stratigraphy followed by an adequate physical sampling and lab analyses program to ensure the longevity of the pipeline installation.

2.0 WORKSCOPE: CSR'S APPROACH

2.1 SURVEY METHODOLOGY

CSR will supply all equipment and survey personnel required to complete the surveys as defined in the RFP. All data collection, quality control and processing will be done by CSR both on site and at our Porters Lake office.

Survey preparation would take place at CSR's main office in Porters Lake. The survey crew, boat and geophysical equipment will transit to the Project Site. Mobilization of the boat will be completed upon arrival at site.

After a successful in water calibration test the vessel will commence survey operations. CSR's Party Chief will communicate with the Client and Project Team on a daily basis. Daily reports will be submitted by email or directly to the Client's Representative in the field.

During the survey, CSR personnel will QC the data in real-time as well as transfer the data to CSR's main office at the end of each survey day. Upon completion of the field work, all data processing, interpretation, mapping and reporting will be conducted at CSR's main office.

The surveys required for this operation are as follows:

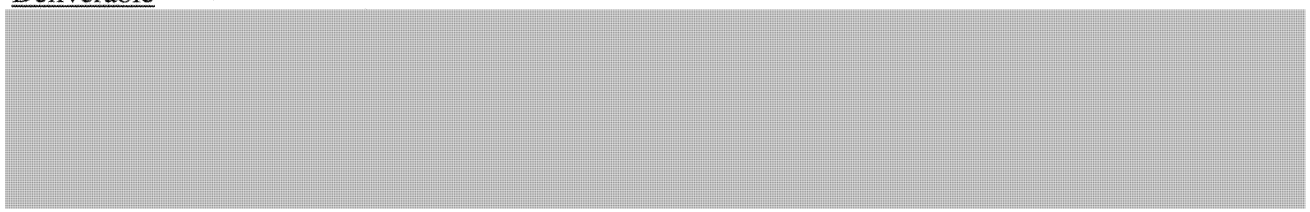
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2.2 Plan View Mapping of Route Using Side Scan sonar



Deliverable



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2.3 Harbour Bottom Video Investigation for Habitat Mapping

- Video Investigation Survey Plan

An Underwater Video Survey Plan will be prepared and drafted as per DFO's underwater video collection standard operating procedures (DFO 1999, 2012). A Video Camera* will be utilized for video collection and will be operated by a CSR surveyor. A Benthic Biologist from Stantec Consulting Ltd will also be onboard to monitor and oversee the operation. The video investigation survey plan will include such details as the specifications and set up plan of the camera, deployment and video collection methodology, and the proposed transects in both table and mapping formats for each survey area. A Stantec Marine Archaeologist will contribute to the Video Survey Plan from the point of view of analyzing the survey for Marine Archaeological resources. The Plan is to be provided as well to the Special Places Coordinator, who reviews archaeological permits and reports for the Province of Nova Scotia, to determine whether the proposed Video Survey Plan will suffice for the archaeological reconnaissance. The survey plan will be compiled into a short report for review by KSH and Northern Pulp one (1) week prior to submission to DFO and a Marine Archeologist with the Special Places Coordinator. The Plan will then be submitted to DFO and a Marine Archeologist for review and comment two (2) weeks in advance of the proposed survey start date.

- Detailed Visual Survey of Specific Areas of Interest

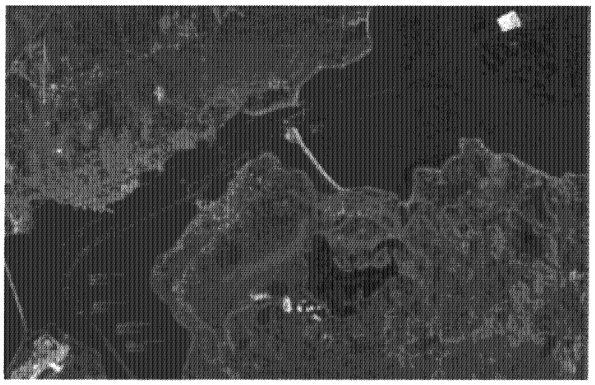
An underwater survey of each of the seven (7) specified areas of interest will be undertaken by the camera The underwater cables between Pictou Landing and the Town of Pictou as well as the cable southwest of Lighthouse Beach will be identified with a Each of these cables will be surveyed within the 200-m width of the outfall route.

- Visual Survey of the Outfall Routing and Eelgrass Delineation

A visual survey of the entire proposed outfall routing will be conducted after the results from the side-scan sonar and are conducted. The side-scan sonar

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The Camera will be used to conduct the underwater video inspection of the proposed centreline pipeline route. The camera will fly at an altitude

In the event that eelgrass beds are identified during the video survey, each bed will be delineated to determine its perimeter. In such an event, the pilot will determine the edge of the bed and follow its perimeter with the ROV. This will allow for the location of the bed and its extent to be mapped out for future use.

- Deliverable

Side-scan sonar data will be used to assist mapping of distinct habitat types of the seafloor of the proposed outfall route. This mapping will initially be used by a Stantec Marine Scientist to determine key habitat types based on substrate classifications observed. A high-level video analysis will be conducted on the entire length of the proposed route to validate areas of key habitat types characterized by the side-scan sonar data, as well as to identify any anthropogenic features within the route. In an attempt to maintain efficiency, once key habitat types have been identified through the aide of side-scan sonar and high-level video reviews, portions of each habitat type (up to 2 kilometres) will be reviewed in higher detail. It is assumed that there will be three to four habitat types within the outfall route based on past experience and existing information. Approximately 500 m of each habitat type will therefore be reviewed in higher detail.
A detailed review of each habitat type characterized will be conducted in a manner as to identify macroflora and macrofauna species distributions to the lowest possible taxonomic level and will be presented as a percentage of substrate covered in 50-m increments of the seabed. This method is recognized by DFO and is a standard approach we typically use for underwater benthic habitat surveys of relatively long linear routes. Substrate type will be determined according to the following classifications:

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- Bedrock
- Boulder (>25 cm)
- Cobble (3-13 cm)
- Gravel (2-3 cm)
- Sands
- Clay Silt
- Organic
- Shell Hash

Macrofaunal species distributions will be classified based on the following categories:

- A = Abundant; numerous (not quantifiable) observations made in the field of view throughout the entire habitat segment.
- C = Common; numerous (not quantifiable) observations made in the field of view intermittently along the habitat segment.
- O = Occasional; quantifiable observations made in the field of view intermittently along the habitat segment.
- U = Uncommon; quantifiable observations made in the field of view infrequently along the habitat segment.

An underwater benthic habitat survey report will be created outlining the key habitat types including macroflora, macrofauna, and substrate identified along the proposed outfall route. A summary table as well as habitat mapping of the outfall route will be incorporated into the report. Habitat mapping will outline key habitat types characterized as well as key macroflora and macrofauna.

- Optional review of underwater video for marine archaeology

It is our understanding that the option for a qualified Marine Archaeologist may be retained to review the video survey resulting from the investigation of the proposed project. Stantec Marine Archaeologist Darren Kipping would review the resulting data from the video survey including any additional remote sensing and geophysical surveys conducted along with the video. The scope of this optional work will include the review of the data and the preparation of a memo detailing the results of the survey as it pertains to Marine Archaeology and will make recommendations for any additional archaeological reconnaissance or screening, if required. This scope will not include a complete marine archaeological reconnaissance/screening such as:

- Preparation and submission of an Archaeological Permit to Nova Scotia's "Special Places"
- Review of sea level curve data and paleo-shorelines;
- Review of historical maps and records of the study area;

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- Review of relevant literature for known, and possible unidentified wreck sites within the study area;
- Review of any additional borehole logs or sediment core data; and
- Preparation of Archaeological Report to satisfy the Archaeological Permit.

Stantec, however, would be pleased to discuss further with NPNS and KSH the inclusion of the above bulleted scope for marine archaeological services, if required, at an additional cost to this proposal.

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2.4 Along Entire Length Of The Pipeline Route

is a standard tool in mapping the subbottom stratigraphy for pipeline routing surveys. It can further be used (in gridline format) to calculate the volumes of sediment to be removed to achieve a certain dredge or burial datum.

Both these examples could very likely be missed by a 200m spaced borehole program.

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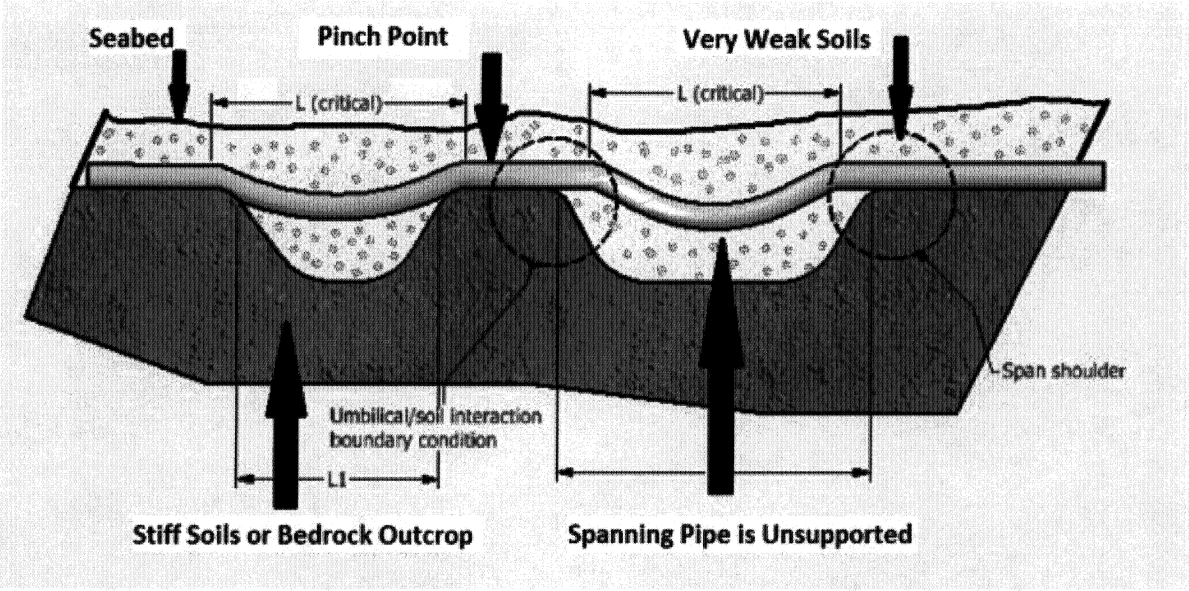


Figure 3, Identify Pinch Points and Channels for Spanning Concerns in weak unconsolidated sediments.

This data may reveal a preferred pipeline route that minimizes or eliminates the requirements for costly engineering remediation such as; rock dumping, dredging, trenching or the use of mattresses.

Geotechnical study. A New route (if Required) would be submitted for approval to the Client, before further work took place.

Stantec Scope

The scope of services covered in this response address the geotechnical requirements necessary to complete the scope of work requested, in concert with the approach defined by CSR in conjunction with Stantec.

Stantec has conducted marine geotechnical investigations for several facilities throughout Pictou Harbour. This in-house knowledge, along with the boreholes that were previously provided by KSH has allowed us to define our scope of work with CSR in a manner that we believe will significantly reduce costs, provide enhanced coverage of the conditions along the entire outfall route, and provide the necessary geotechnical parameters.

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Based on the requirements of the RFQ, we understand that the final deliverable will consist of a geotechnical engineering report which will provide the geotechnical parameters necessary to complete the detailed design of the proposed outfall. The scope of work proposed, and a sampling program completed using is believed to provide the necessary field data required to complete the final deliverable. Based on our joint experience in this area, the soil conditions are anticipated to be conducive to this proposed scope of work.

Stantec's involvement in this proposed scope of work will include the following:

- Review of the to determine the proposed locations for obtaining vibrocores.
- Provide full time geotechnical staff on board the vessel during the collection of the
- Conduct laboratory index testing on samples for classification and evaluation of the engineering properties. Testing would include, but not limited to, moisture content determinations, grain size analyses, hydrometers, and pocket penetrometer testing.
- Preparation of a geotechnical report which will provide all of the necessary parameters noted in the RFQ.

It is our combined belief that the proposed scope of work for this investigation will be highly beneficial to the owner as a means of providing a cost-effective solution for obtaining the necessary geotechnical parameters.

In the unlikely event that an anomaly outside of the anticipated conditions is encountered, which is not able to be explored using the method, our team can provide a scope of work and cost estimate to complete a very specific and targeted investigation.

Deliverable

Complete Longitudinal and transverse soil profiles, showing; spanning concerns, pinch points, subbottom stratigraphy , bathymetry etc. Geohazards and core locations showing primary Unit results will be plotted on these profiles.

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2.5 Geotechnical [redacted] To Confirm Soils

A Geotechnical program can now take place along the preferred pipeline route. It is the CSR-Stantec's team opinion that the combination of a continuous [redacted], along with [redacted] within the upper 5m will be sufficient for pipeline design. In fact, we feel it represents a significant value add to the overall design of the pipeline as extremely useful (and calibrated) soils information is collected along the entire route and not just at 200m stations.

This would also eliminate the added cost of a Geotechnical Drilling Program in favour of the [redacted] program.

A review of the [redacted] would allow us to carefully site each core where we could optimize the returned information [redacted]

A 40' Cape Island style survey boat with a large A-frame will be used to collect the [redacted]

An onboard Stantec Geotech Engineer would oversee CSR's coring operation and thus offer daily feedback to the Client regarding pipeline bearing issues and whether additional studies are warranted.

[redacted]

Option
This boat is also suitable to collect optional grab samples at each 52 stations of the bottom for infauna documentation or for environmental contaminant testing.

Deliverable
Complete profile of the Pipe alignment showing; scaled bathymetry, subbottom stratigraphy, Geohazards and core locations showing primary Unit results.

In addition the [redacted] and Lab test results will form an Appendix in the report.

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2.6 Survey of the 7 Site Specific areas

1) The Underwater cable between Pictou Landing and Pictou.

This area will be surveyed with the 300m wide corridor using [redacted] side scan sonar. If the cable is not buried we should see it and map it using side scan. If it is partially or fully buried, it will not be visible on either side scan or underwater video camera. We will therefore survey and map its location using a marine [redacted]

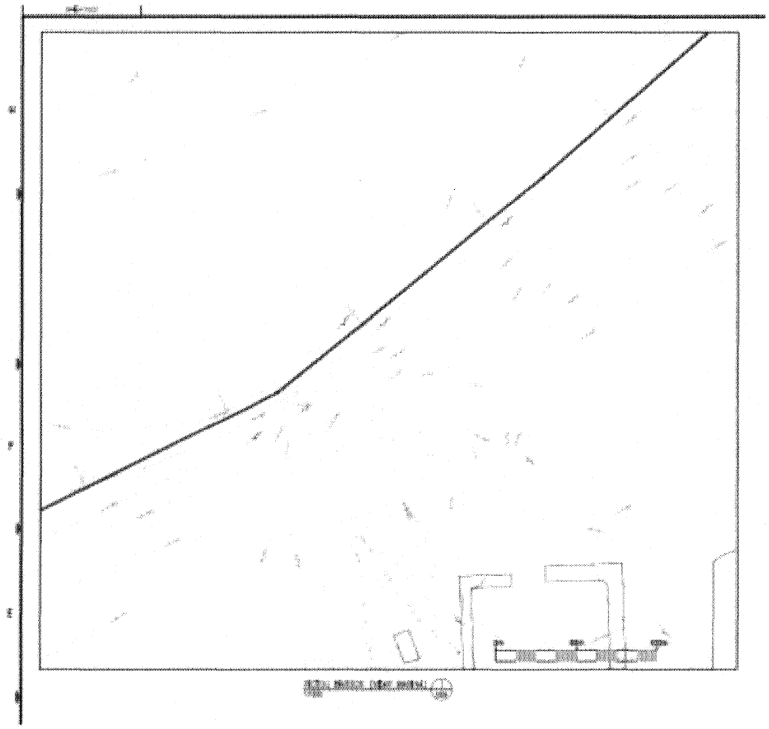
Additional Video drops will be undertaken here to confirm the cable and map out the marine habitat

2) The Protected Shipwreck in Pictou harbour

This area within be surveyed with [redacted] side scan sonar. A series of lines will be run to obtain high resolution images of the wreck and the surrounding habitat.

Additional Video drops will be undertaken here to map out the wreck and marine habitat

3) Pictou Harbour Near Marina



This area is an area of shallow waters where a ridge like structure extends seaward from the

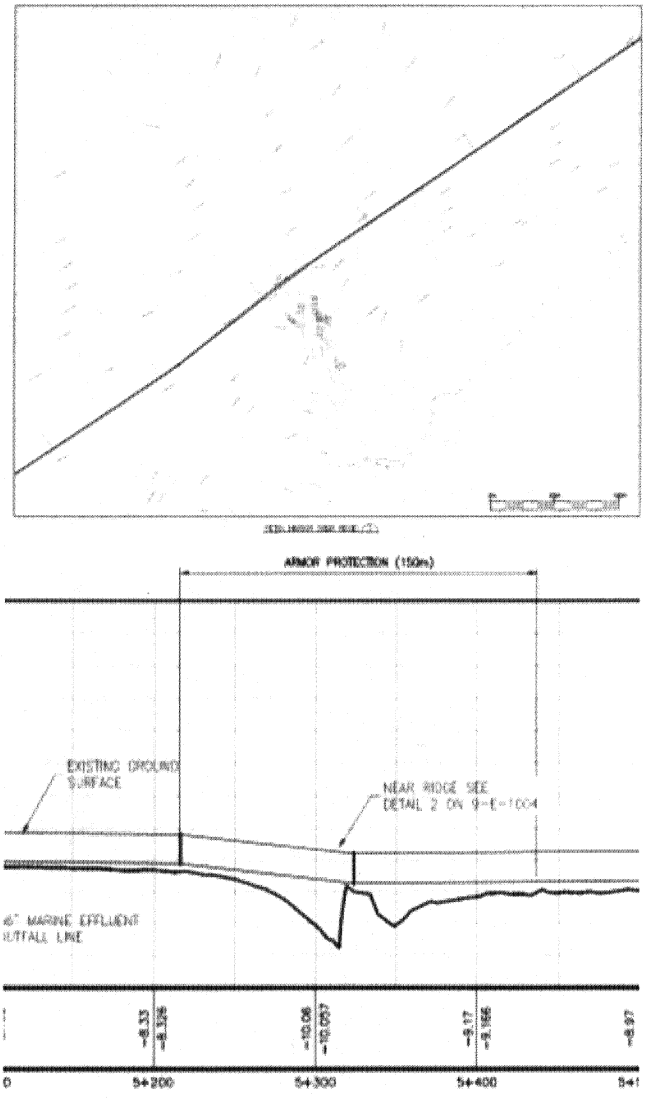
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Marina area.

This area within be surveyed with side scan sonar. It may be prudent to move the pipeline to the NW away from the steep slopes that may be subject to slope failure or creep.

Additional Video drops will be undertaken here to map out the marine habitat.

4) Pictou Harbour Near Ridge



This ridge is a positive relief feature that may be composed of sands or tills that may be underlain by bedrock. The pipeline profile section shows almost 2m of relief with a sharp

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sloped trough and ridge feature that must be remediated with armour protection before pipeline placement.

Survey work further to the NW is recommended as this remediation may not be required.

This area within be surveyed with side scan sonar.

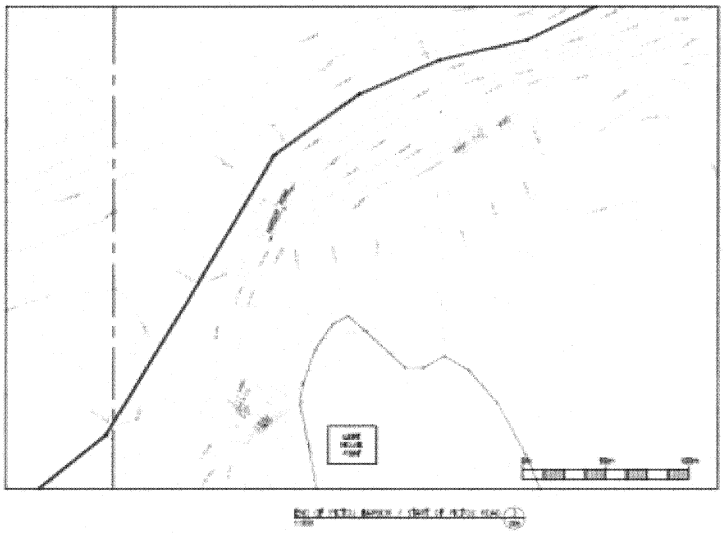
Additional Video drops will be undertaken here to map out the marine habitat

5) The Underwater Cable SW of Lighthouse beach.

This area will be surveyed with the 300m wide corridor using side scan sonar. If the cable is not buried we should see it and map it using side scan. If it is partially or fully buried, it will not be visible on either side scan or underwater video camera. We will therefore survey and map its location using a

Additional Video drops will be undertaken here to confirm the cable and map out the marine habitat

6) End of Pictou Harbour/Start of Pictou Road



This area is an area of shallow waters where a platform like structure extends seaward from Lighthouse Point.

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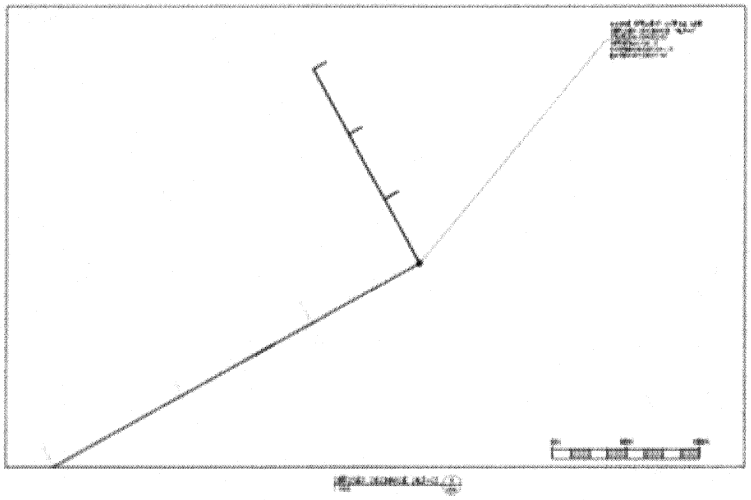
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This area will be surveyed with side scan sonar. It may be prudent to move the pipeline somewhat to the NW away from the steep slopes that may be subject to slope failure or creep.

Additional Video drops will be undertaken here to confirm the geology and map out the marine habitat.

7) The Anticipated Point of Diffuser Discharge



The diffuser location is located in 11-12m water depths. The area appears to be moderately sloped and has no major seabed roughness according to the Profile plan.

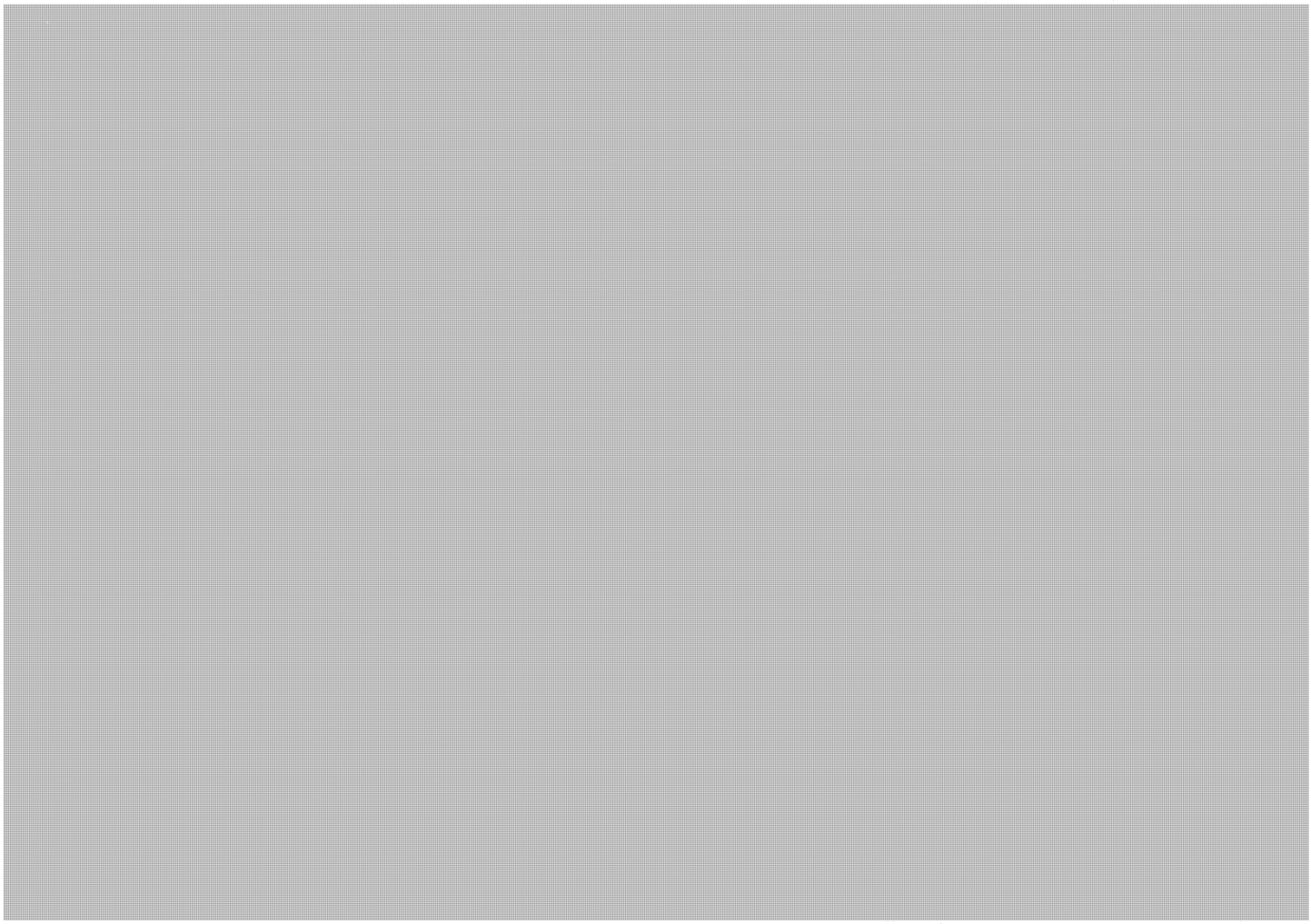
This area will be surveyed with side scan sonar, extending 200m beyond the current diffuser location. As the diffuser and pipe will be buried from

Additional Video drops will be undertaken here to confirm the geology and map out the marine habitat.

Optional, 8) Pipeline Entry Location

We have selected an optional site where the pipe will be buried at the entry location roughly from . This section is orthogonal to the main route and in fairly shallow waters (See Figure 4).

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Deliverables

- The deliverables for the 7 sites will be somewhat different for each site.
- The positions of Subsea cables will be mapped on the sonar mosaic.
- Geological or topographic issues will be discussed and illustrated through
- The wreck will be discussed and mapped if within the survey corridor. Sonar and video images may be presented.
- The diffuser location will be discussed in terms of burial potential through the use of

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3.0 TEAM EXPERIENCE

CSR GeoSurveys is pleased to work together with Stantec on this project. We have a long history of successful joint projects that dates back to the early 1990's.

CSR has extensive experience conducting pipeline and cable geophysical route surveys around the world. Likewise, Stantec has a long history of Marine Geotechnics for marine structures as well as, Biological habitat and marine archeological expertise.

We look forward to working on this project should we be successful. For contractual purposes CSR is Prime Contractor and Stantec is our subcontractor.

3.1 CSR's Direct Experience

In 2002, CSR was contracted by Kimberly Clarke and Jacques Whitford to conduct a marine survey of Boat Harbour. The survey included the acquisition of bathymetry data in support of a proposed pipeline installation from the Aerated Stabilization Basin to the Northumberland Strait.

In 2006, CSR was contracted to conduct a geophysical survey of Boat Harbour, Pictou County. The project included the acquisition of single beam echosounder, sidescan sonar and microprofiler data. The [redacted] micro-profiler system profiled the top of fluff and the bottom of sludge throughout the Harbour. Volumes of fluff and sludge were calculated to aid proposed dredging of the material.

In 2009, CSR completed a geophysical survey of the East River pipeline crossing for Amec & Northern Pulp. The survey included Single bean echosounder to examine slope, water depth and morphology of the bottom across the East River.

- Side scan sonar system to provide detailed imagery of the riverbed surficial geology, sediment transport features, and identify features of concern for the proposed pipeline such as boulders, cobble, sunken logs, anthropogenic debris, scouring etc.
- Chirp profiler to quantify the depth of soft sediments expected within the near surface and identify any subsurface hazards such as boulders, older pipelines and buried anthropogenic debris.

Our Full list of Corporate Experience is found in Appendix 1

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3.1 CSR'S PROJECT PERSONNEL& MANAGEMENT

A good project management structure is essential if the work is to fully meet the specifications and be carried out in a cost-effective and timely manner. CSR's experience has shown the importance of appointing a manager to supervise the project from the outset, maintaining a complete overview of all aspects of fieldwork and the subsequent compilation of reports and charts. This role will be assigned to a Project Manager who will be experienced in the planning and execution of marine surveys and will liaise with the client to ensure that all technical, commercial and contractual requirements are fulfilled.

Personnel from a variety of survey disciplines will be required for the various phases of the survey. The content of the survey crew is determined by CSR's understanding of the survey requirements as defined in the Scope of Work and CSR's extensive experience in undertaking this type of survey. CSR key personnel include.

PERSON	TITLE	ROLE
Glen Gilbert (P.Geo.)	President Marine Geophysicist	Project Management
Pat Campbell (P.Geo.)	General Manager Marine Geologist	Lead Geoscientist Project Management (Alternate)
Colin Toole	Operations/Safety Manager Geologist	Onboard Party Chief
Matt Savelle	Hydrographic Surveyor	Geophysical Operator Onboard Party Chief (Alternate)
Luke Melanson	Marine Geologist	Geophysical Operator Interpretation & Reporting
Mark White	Geomatics Manager	Charting & QA/QC
Archan Dabadi	Marine Geomatics Specialist	Interpretation and Mapping

Resumes are available upon request.

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Glen R. Gilbert President and Principal of CSR GeoSurveys Ltd.

[redacted]

Patrick Campbell Vice President and Principal of CSR GeoSurveys Ltd.

[redacted]

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[redacted]

Colin Toole General Manager and Principal of CSR GeoSurveys Ltd.

[redacted]

[redacted]

3.2 STANTEC KEY PERSONNEL

Summaries of Stantec key personnel are presented below. Our Full list of Corporate Experience is found in Appendix 2 and 3.
Detailed resumes are included in Appendix A.

James Mitchell, P.Eng., [redacted]

[redacted]

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Dan McQuinn, P.Eng., Senior Geotechnical Engineer.

Sam Salley (M.Sc.) is a Senior Marine Ecologist and Oceanographer with Stantec Consulting

Sean Wilson (B.Sc.) is an Aquatic Scientist and Project Manager in Stantec's Dartmouth office,

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Doug Rimmer (B.Sc.) is an Environmental Scientist for the Environmental Management Division of Stantec.

Darren Kipping (M.A. Maritime Archaeology) is an Archaeologist with Stantec's Environmental Services group.

Fred Schwarz (Ph.D. Archaeology)

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1.4 Health, Safety & Environmental

CSR has a long term commitment to safety on the job site and has not had any lost time due to accidents in 30+ years. CSR has an offshore safety manual that each of its employees must become familiar with, in addition to taking safety courses and on the job training. All CSR personnel are trained in Basic Offshore Survival MED-A1 or higher, marine first aid, and WHIMS. CSR has the lowest workers compensation experience rating for its industry.

CSR is a COR certified member of the Nova Scotia Construction Safety Association. The Construction Safety Nova Scotia's Certificate of Recognition (COR) program is the most widely accepted standard for safety certification in Atlantic Canada.

CSR has been a member of ISNetworld since 2014. ISNetworld collects and maintains self-reported contractor information such as insurance documents, safety programs and incident rates. ISN's Review and Verification Services team reviews contractors' information against regulatory and client requirements. ISNetworld helps connect safe, qualified contractors and suppliers with Clients around the globe, facilitating partnerships to help ensure safer job sites.

CSR has worked in many environmentally sensitive areas. We are responsible practitioners of terrestrial and marine environments.

CSR will initiate a pro-active safety plan for this project upon contract award to ensure the requirements of this job are met within safe working guidelines. The CSR team is well versed with safety requirements through training and operational experience. Good communication will be encouraged as often this can pro-actively deal with problems before they occur.

Upon contract award, CSR will develop comprehensive HSE plan. This plan will be completed and submitted for review in advance of the commencement of the field work. Field work will not begin until the HSE plan has been approved by the Client.

1.5 Quality Control

CSR's mission statement is *"a commitment to performance, quality, service, and state-of-the-art technology"*. CSR has an internal quality assurance/control system to ensure quality is maintained throughout all phases of the project. In all work undertaken by CSR, quality control is considered an essential activity at every stage. Senior management personnel have been trained in the quality system. These senior personnel ensure quality control procedures are followed by all personnel involved in the program. CSR's Quality Assurance / Quality Control system has been reviewed and accepted by ISNetworld. All surveys are conducted according to hydrographic procedures developed by CHS & NOAA based on IHO standards.

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4.0 SURVEY EQUIPMENT

4.1 GEOPHYSICS PROGRAM

4.1.1 "SEASTAR" ROSBOROUGH; RF 22, SURVEY BOAT

The RF 22 survey boat "SEASTAR" is a proven rough water survey boat designed after the East Coast Cape Island style fishing boat. She is still small enough to be launched and operated in nearshore areas where shallow water survey data is required.

She was purchased new by CSR in 2006 and has been proven on a series of survey jobs from Lake Ontario to Newfoundland.





Length:	22'
Beam:	8'
Draft"	1' approx
Weight:	5500 lbs approx.
Construction:	Heavy Fibreglass Fully Enclosed wheelhouse Forward and wheelhouse equipment cuddy
Deck Equipment	Aluminum A-Frame with tow blocks Odom and Reson Multibeam Mounts Honda 2500 generator in enclosed box
Propulsion:	115 HP 4 stroke Yamaha 60 gallon fuel tank Weight: 250 lbs 9.9 HP Evinrude Aux Motor

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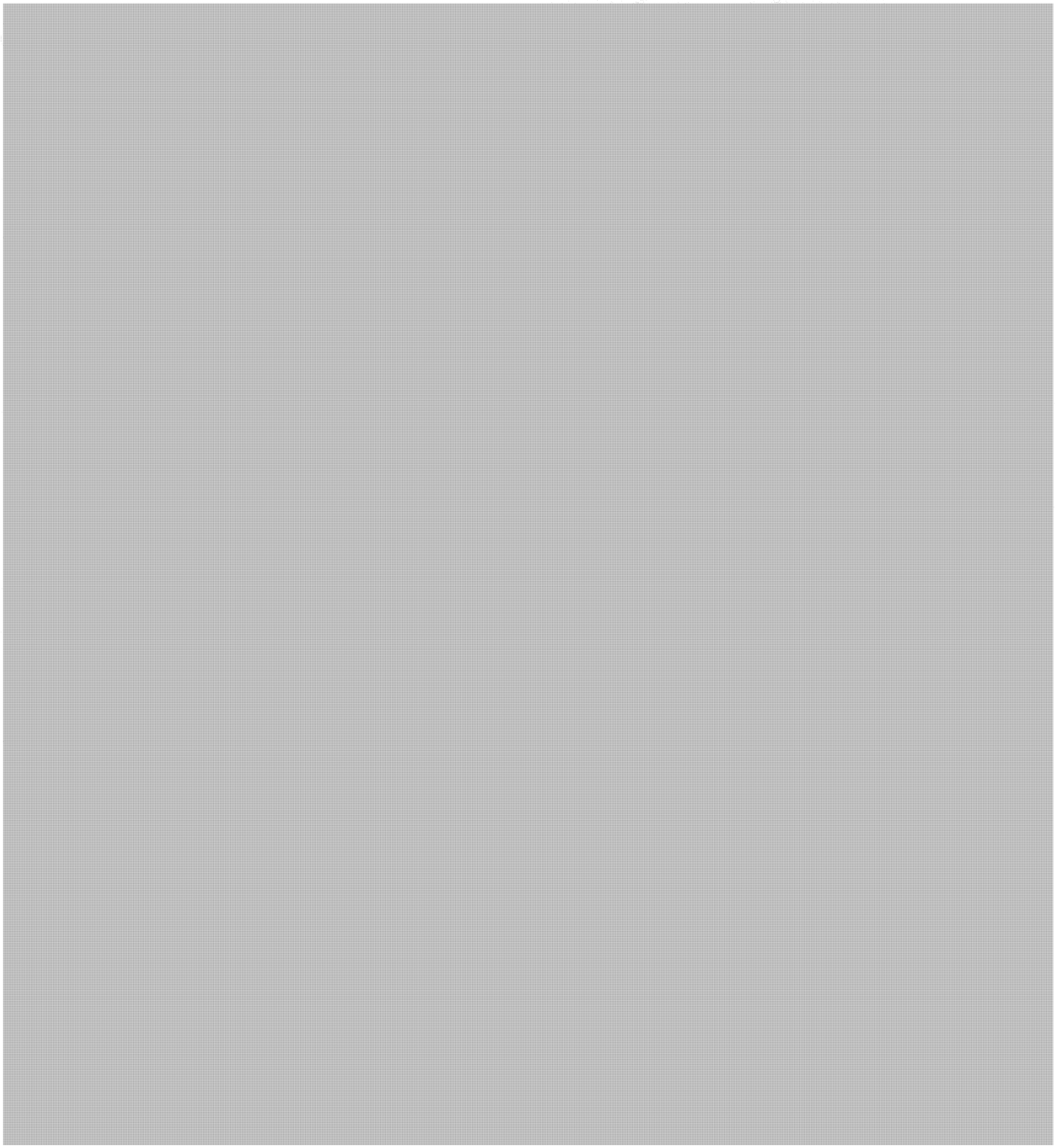
4.1.2 [redacted] NAVIGATION SYSTEM

[redacted]

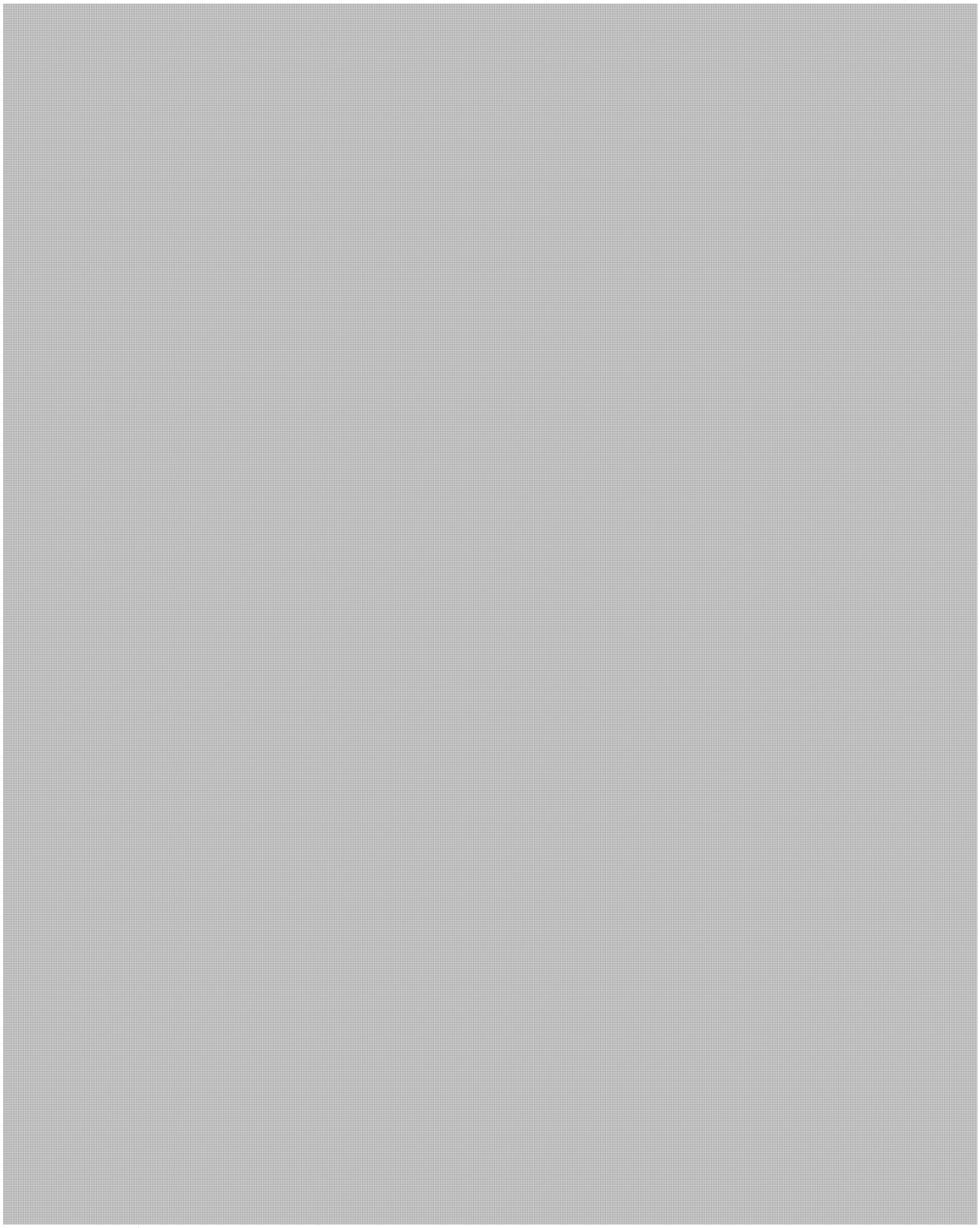
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4.1.3 Side Scan Sonar System



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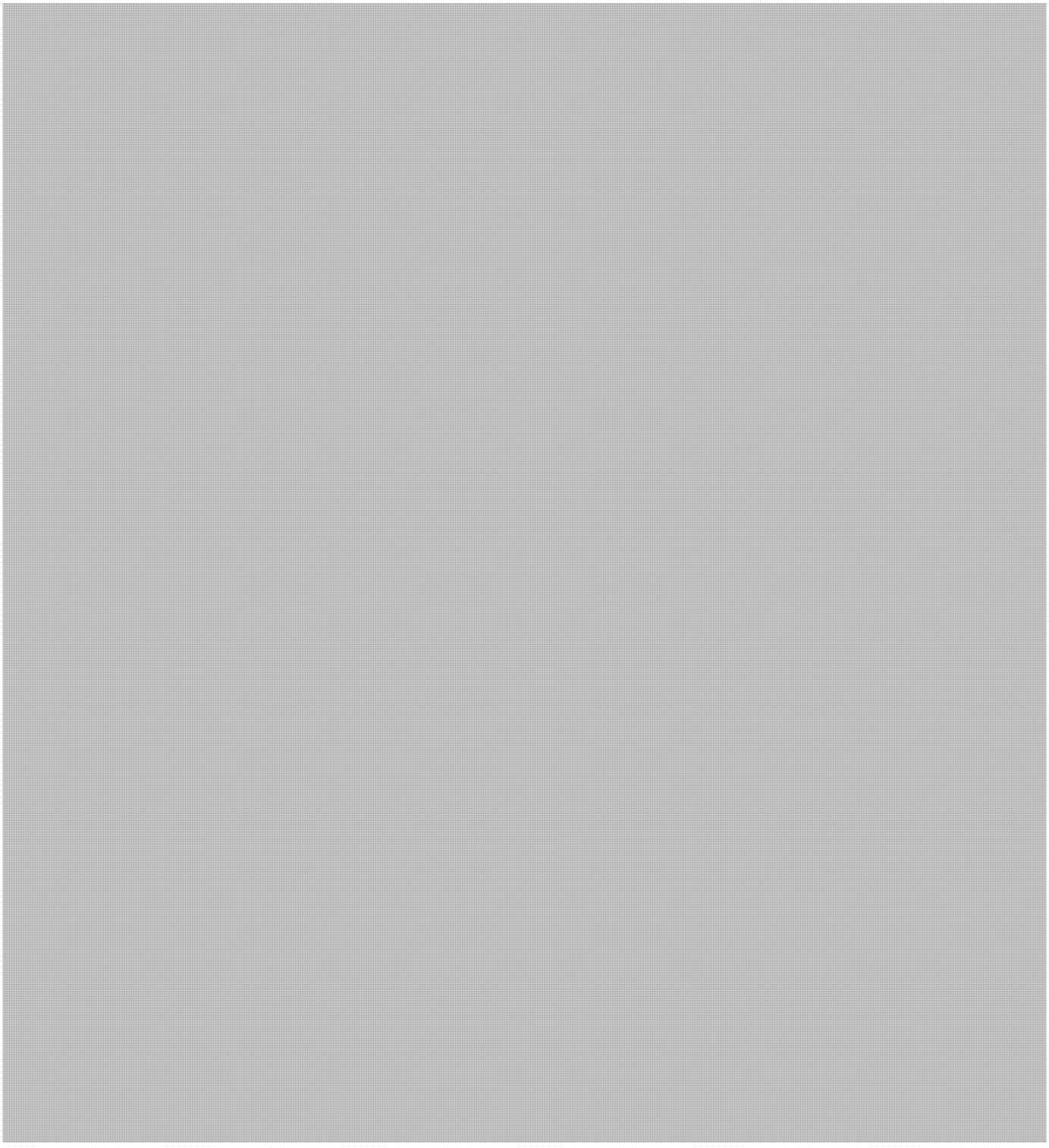


Example of Different Surficial Geology Units Supporting Different Habitats

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4.1.4 CSR'S Underwater [redacted] Video Camera



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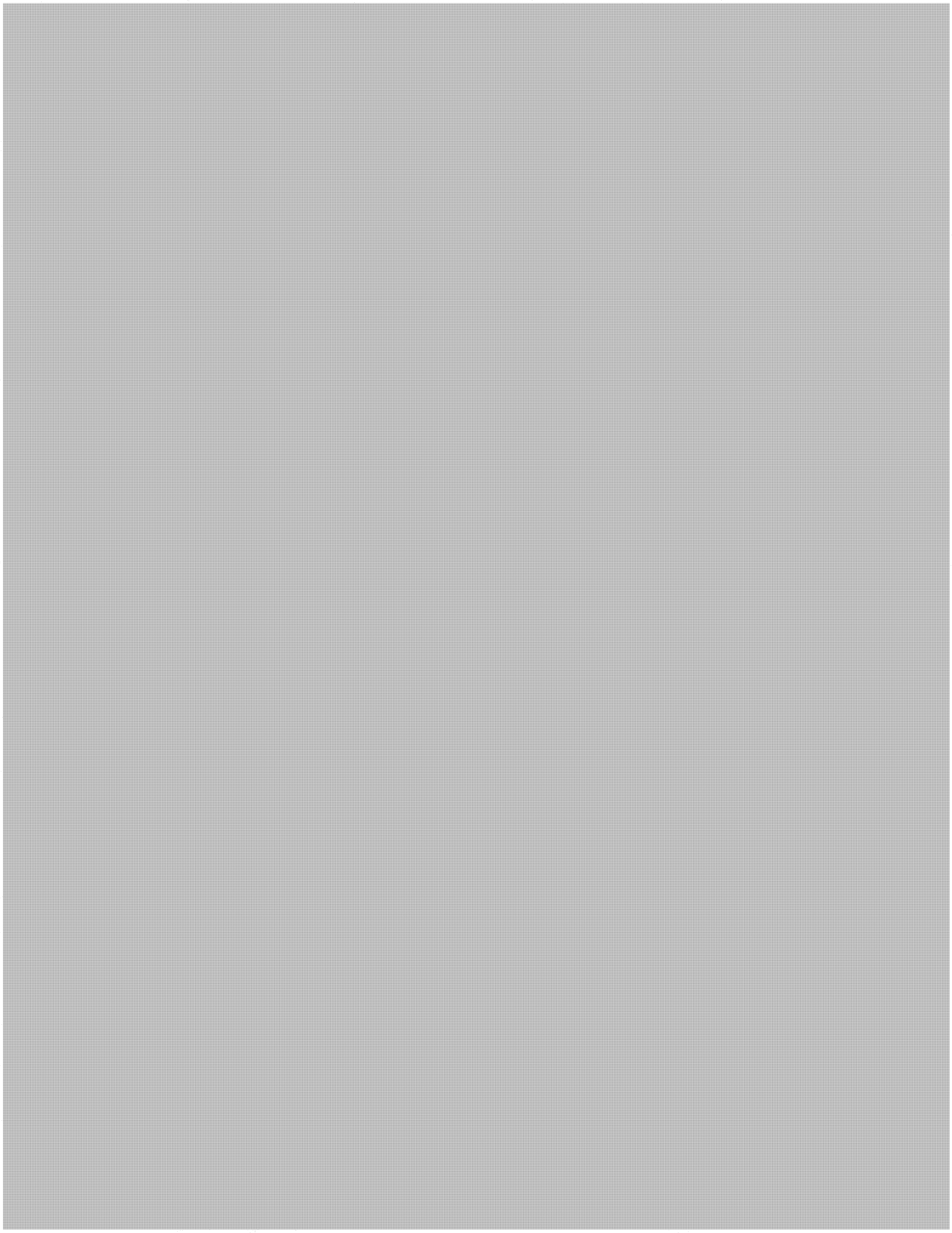
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4.15 [redacted]

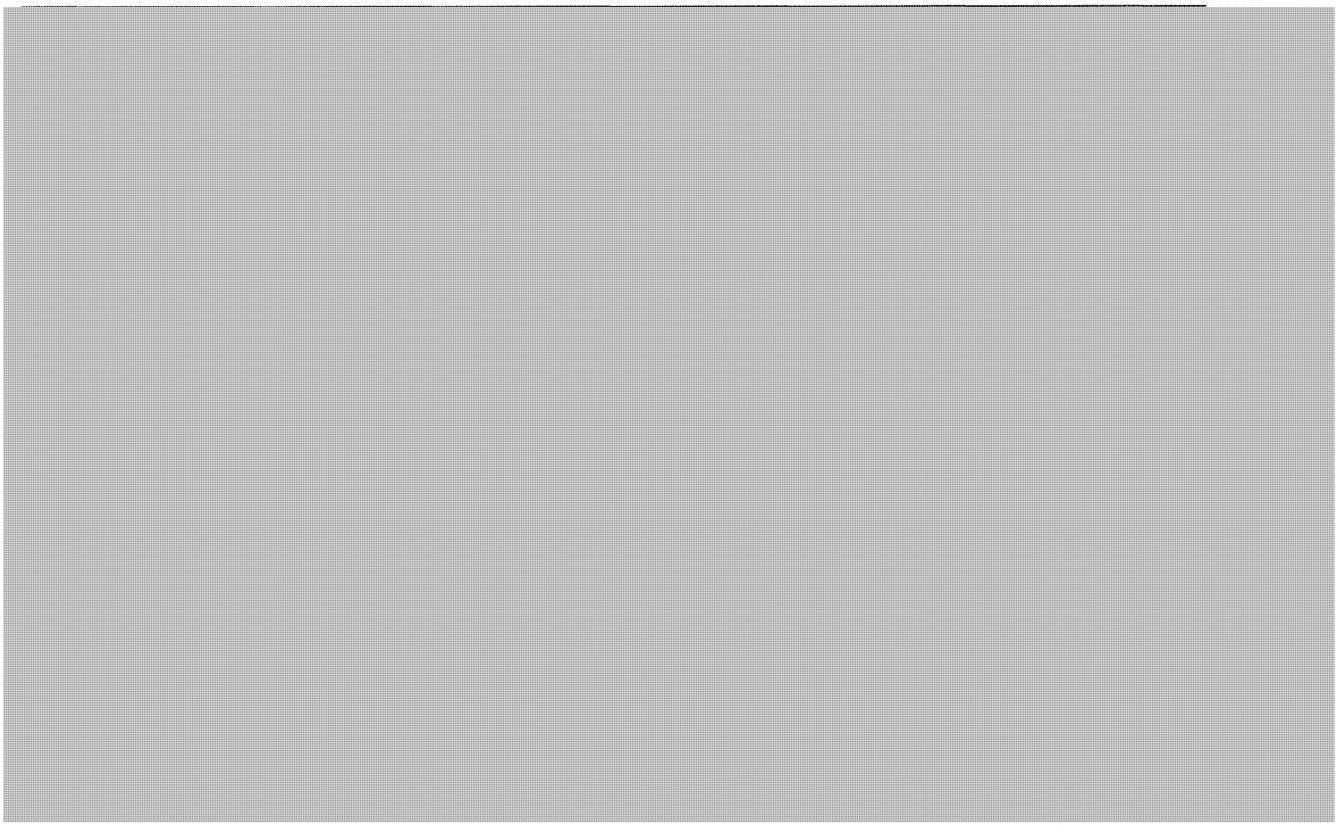
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4.15 [redacted] MAGNETOMETER

A marine magnetometer can also be used in conjunction with other geophysical tools to help discern anthropogenic ferrous-based materials on the seafloor.

[redacted]

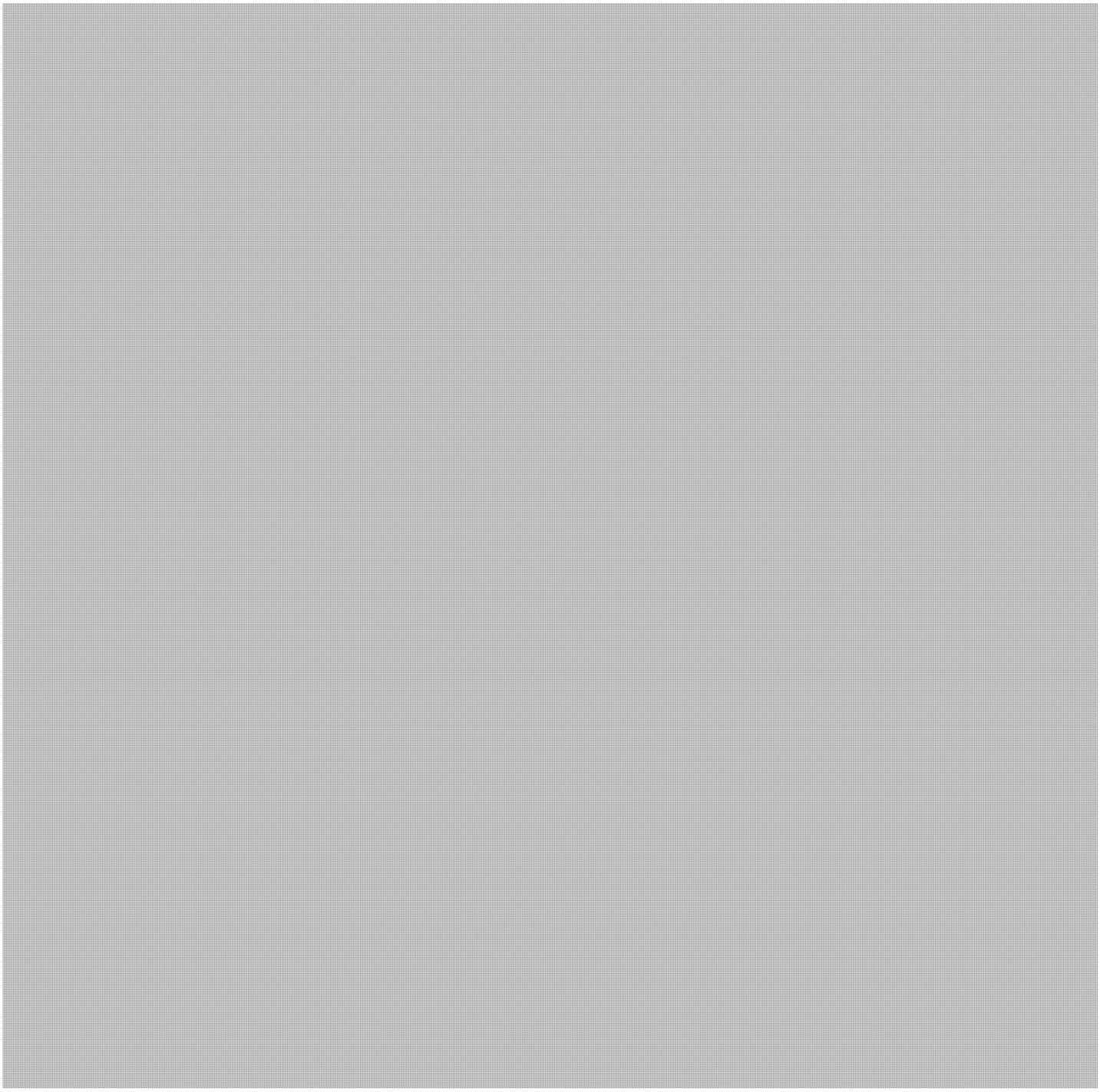
QUALITY CONTROL OF MAGNETOMETER DATA

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4.2 GEOTECHNICAL PROGRAM

4.2.1



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4.1.2 NAVIGATION SYSTEM

[redacted]

Receiver

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4.2.3

is an efficient and versatile method for obtaining well-preserved cores in consolidated water-saturated sediments from wetlands, harbours, lakes and offshore.

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APPENDIX 1 - CSR CORPORATE PROFILE AND EXPERIENCE

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1.0 CORPORATE

CSR GeoSurveys Ltd. (CSR) is a company of professional geoscientists, geophysicist, and hydrographers who conduct hydrographic, geophysical and geotechnical surveys for various applications. Some of which include hydrographic, port engineering, geohazard assessment, foundation analysis, petroleum, cable & pipeline routing, and marine renewables applications. Our team provides a complete marine survey solution that includes; RTK & DGPS positioning, hydrographic surveying, seafloor imaging, sub-bottom profiling, geotechnical analyses and comprehensive reporting and mapping.

Building on a foundation of over 30years project experience, CSR has developed a solid reputation for achieving the highest quality results. This is based on careful project planning, the use of new, innovative equipment and the unique experience our professional team brings to project interpretation and reporting.

Our survey services have extended throughout Canada and the High Arctic, United States, Russia, South China Sea, Norway, Caribbean, and South America. Our solutions are often innovative and are always based on a thorough understanding of marine geological and geophysical principles. Additional information can be found on our web site at www.csr-marine.com.

Today, CSR ranks as a leader in seafloor mapping using automated digital technology. Our future will continue to be based on excellence and creative innovation in the earth sciences. Last but not least, we enjoy what we do.

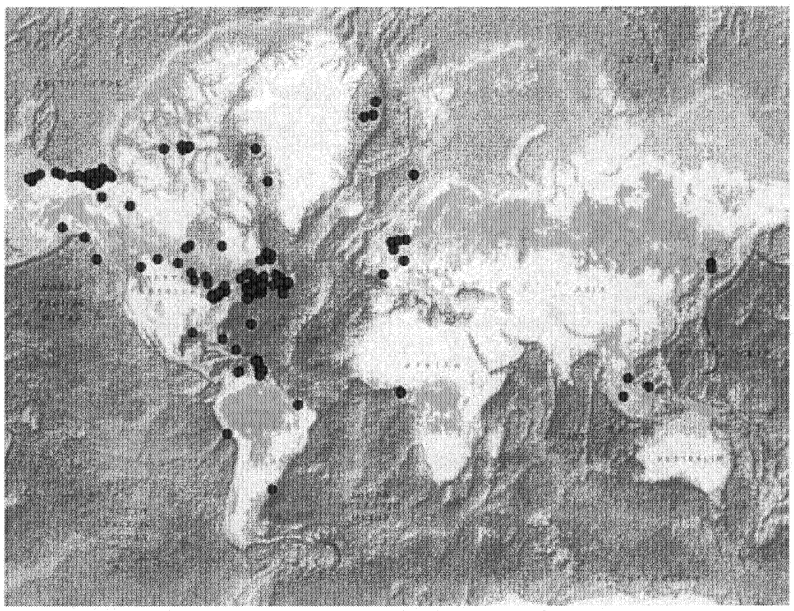


Figure 2.1 - CSR Project Locations

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2.1 CSR EXPERIENCE

CSR's experience ranges from survey planning, acquisition, analysis, interpretation, compilation of hydrographic / marine geophysical data, and reporting. We **have conducted 100's of surveys** in many diverse and often challenging regions. Some of our recent projects include.

Project	Location	Type

Additional project experience and references are available upon request.

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2.2 PROJECT PERSONNEL & MANAGEMENT

A good project management structure is essential if the work is to fully meet the specifications and be carried out in a cost-effective and timely manner. CSR's project manager will supervise the project from the outset, maintaining a complete overview of all aspects of fieldwork and the subsequent compilation of reports and charts. This role will be assigned to Patrick Campbell who is experienced in the planning and execution of marine surveys and will liaise with the client to ensure that all requirements are fulfilled.

Personnel from a variety of survey disciplines will be required for the various phases of each project. The content of the survey crew is determined by CSR's understanding of the survey requirements as defined in the Scope of Work and CSR's extensive experience in undertaking this type of survey. CSR understands the importance of having a strong, experienced team for the successful execution of technically challenging projects. CSR key personnel include.

PERSON	TITLE
Glen Gilbert, P.Geo.	President, Geophysicist
Pat Campbell, P.Geo.	General Manager, GeoScientist
Colin Toole	Operations/Safety Manager, Geologist
Mark White	Geomatics Manager
Matt Savelle	Hydrographic Surveyor
Luke Melanson	Geologist, Marine Geomatics Specialist
Archan Dabadi, P.Geo.	Geologist, Marine Geomatics Specialist

Resumes are available upon request.

2.3 PROJECT QUALIFICATIONS

Several recent relevant CSR projects are included within this section.

Pages 927 to / à 940

are withheld pursuant to sections

sont retenues en vertu des articles

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of the Access to Information Act

de la Loi sur l'accès à l'information

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2.4 Health, Safety and Security

CSR has a long term commitment to safety on the job site and has not had any lost time due to accidents in 30+ years. CSR has an offshore safety manual that each of its employees must become familiar with, in addition to taking safety courses and on the job training. All CSR personnel are trained in Basic Offshore Survival MED-A1 or higher, marine first aid, and WHIMS. CSR has the lowest workers compensation experience rating for its industry.

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NSCSA COR Certification
Member ID: CANAD071
Certificate No.: 50194

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Upon contract award, CSR will develop comprehensive HSE plan. This plan will be completed and submitted for review in advance of the commencement of the field work. Field work will not begin until the HSE plan has been approved by the Client.

2.5 Quality Assurance and Quality Control

CSR's mission statement is *"a commitment to performance, quality, service, and state-of-the-art technology"*. CSR has an internal quality assurance/control system to ensure quality is maintained throughout all phases of the project. In all work undertaken by CSR, quality control is considered an essential activity at every stage. Senior management personnel have been trained in the quality system. These senior personnel ensure quality control procedures are followed by all personnel involved in the program. CSR's Quality Assurance / Quality Control system has been reviewed and accepted by ISNetworld.

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APPENDIX 2: STANTEC RELEVANT GEOTECHNICAL EXPERIENCE

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STANTEC - GEOTECHNICAL PRACTICE IN ATLANTIC CANADA

The Stantec Geotechnical Practice has a proven track record to meet testing, reporting and scheduling timelines on numerous projects for a wide range of clients (both government agencies and private sector clients) for geotechnical investigations and related testing. In Nova Scotia, our geotechnical team has been providing these services since 1972. The 46 years of providing geotechnical services and many past projects gives clients the benefit of our knowledge and internal database of subsurface conditions throughout onshore areas of Nova Scotia and in the nearshore marine areas as well. This knowledge helps Stantec optimize the early stages of site investigation programs and helps our clients make cost effective use of the investigation budget.
Stantec currently has ten office locations in the Atlantic Provinces and our geotechnical resources within these offices number about 170 engineers, technicians and support staff. Our proposed work force to complete the technical elements of the investigation and testing for this project will be our permanent staff members from our local community offices situated in both Dartmouth and Antigonish, Nova Scotia.
In Nova Scotia, Stantec maintains permanent offices and geotechnical testing laboratories at three locations:

City	Address
Dartmouth	102 - 40 Highfield Park Drive
Antigonish	2847 Highway #104 Post Road
Sydney	207 – 201 Churchill Drive, Membertou (Sydney area)

The geotechnical departments in these offices work together and share personnel and equipment resources. Our collaborative approach is particularly beneficial for the subject site due to the proximity to our Antigonish office and our Nova Scotia main office in Dartmouth.

STANTEC – MARINE GEOTECHNICAL EXPERIENCE

Stantec has been conducting marine geotechnical investigations, both nearshore and offshore, in Atlantic Canada since 1972. Our over 45 years of experience in this specialized area of work exceeds all of our regional competitors combined and thus gives confidence to CSR and Paper Excellence Canada in Stantec's ability to complete this project.
Our experience in marine geotechnical investigations is evident from the partial list of completed projects below. This list is followed by a more detailed description of some of these past projects more relevant to the current requested scope of work.

Partial List of Stantec Marine Geotechnical Investigation Projects:

Project	Client	Timeframe
[redacted]		

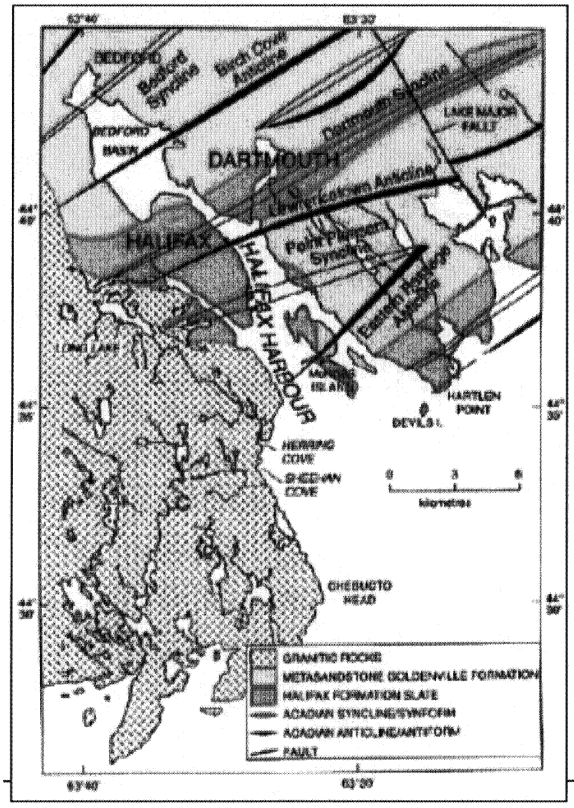
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Project	Client	Timeframe
[redacted]		

The following references and projects are presented below in more detail to show Stantec experience relevant to the current scope of work for this RFP

References:

1. Project Name: Halifax Harbour Natural Gas Pipeline Crossing, Halifax, NS
   Client: Heritage Gas Limited
   Client Contacts: Michel Sarrouy, P.Eng., Vice President – Engineering and Construction, Suite 200, 238 Brownlow Avenue, Dartmouth, NS, B3B 1Y2, [redacted] (ph), 902-466-2140 (fx), [redacted] (email).



In 2007, Stantec completed a comprehensive geotechnical investigation on behalf of Heritage Gas Limited for the Halifax Harbour natural gas pipeline crossing, currently in operation. Stantec's scope of work consisted of review of regional and local geologic data, completion of test pits and probes, drilling of land-based and marine based shallow and deep boreholes, laboratory testing on soil and bedrock samples, and providing geologic and geotechnical data for engineering design of the proposed pipeline crossing by HDD (horizontal directional drill) methods.

Information obtained included surface and bedrock geology; structural geology of the bedrock; rock mass properties; joint orientations; rock hardness, strength and abrasiveness; permeability of the rock; and determination of tunnel quality index "Q" and rock mass rating (RMR).

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Our work included two geotechnical boreholes at the shore approach and three in Halifax Harbour for characterizing subsurface soil and bedrock conditions up to 80 m below the harbour bottom. Marine boreholes were completed with a conventional geotechnical drill mounted on a four-point anchored barge operated on a 24-hour basis. The total length drilled for the marine boreholes was approximately 300 m. A barge tender vessel was used to move the barge between boreholes and to transport crew to and from shore. Safety and marine traffic protocols were developed and implemented to allow the work to proceed in close proximity to a major shipping channel in Halifax Harbour. Total length of boreholes drilled was approximately 300 m at five drill locations. In addition to obtaining soil and bedrock core samples and detailed inspection, the geotechnical assessment included downhole packer testing and strength and index testing in the lab on prepared rock samples. The existence of fault zones in the quartz and slate bedrock was considered in the analysis.

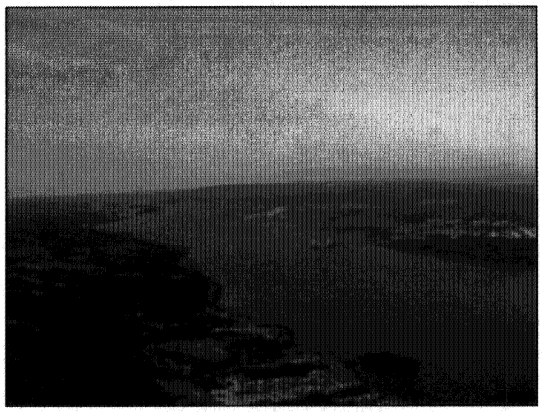
The engineering information was used to develop geotechnical recommendations to assist in planning the horizontal directional drilling (HDD). Stantec provided experienced engineers and technicians to manage local contractors who provided and operated the required marine and drilling equipment to complete the geotechnical field program.

Heritage Gas was recognized with the 2009 Lieutenant Governor's Award for Excellence in Engineering for this project.

2. Project Name: NSPI Bulk Handling Facility, Point Tupper, NS
Client: CBCL Limited
Client Contacts: Dan MacDonald, P.Eng., 164 Charlotte Street, Suite A, Sydney, NS, B1P 6H4, 902-539-1330 (ph), 902-539-4406 (fx), danm@cbcl.ca (email).



Stantec completed a geotechnical investigation for the bulk coal handling facility at the Nova Scotia Power Inc. generating plant in Point Tupper, Nova Scotia between October and December 2003. The work comprised of six land-based boreholes, 12 marine based boreholes and two marine based Cone Penetration Tests (CPTs). The geotechnical investigation was completed with the purpose of assessing subsurface conditions and providing recommendations to support design of land based structures (conveyors) and marine based structures (mooring and breasting dolphins and trestle).



Land based boreholes were drilled to depths up to 11 metres and marine based borehole depths were up to 33 m below the mudline. The marine based boreholes were completed in water depths ranging from approximately 5 to 22 m. The marine work was completed using a conventional CME 55 drill mounted on a 26 x 8 m barge fitted with a four-point anchoring system. A boat and crew supported the barge operation. Overburden was sampled

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using conventional split-spoon samplers while performing Standard Penetration Testing and bedrock was cored using HQ sized core barrel. All recovered overburden and rock core samples were taken to our laboratories for final assessment and testing purposes.
Stantec provided experienced engineers and technicians to manage local contractors who provided and operated the required marine and drilling equipment to complete the geotechnical field program. Our services included drill supervision, detailed core logging, field testing, coordination and completion of laboratory testing and associated geotechnical analysis and reporting.

3.	Project Name:	Strait of Belle Isle 2009 Geotechnical Program, Strait of Belle Isle, NL
	Client:	SNC-Lavalin Inc. / Nalcor Energy
	Client Contacts:	SNC - Michael Wawrzkow, P.Eng., 1133 Topsail Road, Mount Pearl, NL, A1N 5G2, 709-368-0118 (ph), 709-368-3541 (fx), michael.wawrzkow@snclavalin.com (email); Nalcor – 500 Columbus Drive, P.O. Box 12800, St. John's, NL, A1B 0C9, 709-737-1440 (ph), 709-737-1800 (fx).

Stantec was selected by SNC-Lavalin to provide geotechnical consulting services for the Strait of Belle Isle 2009 Geotechnical Program in support of the Nalcor Energy Lower Churchill project. The program contributed to ongoing engineering feasibility studies associated with potential installation of power cables across the Strait in connection with the proposed transmission link between Labrador and the Island of Newfoundland. The installation would involve the placement of power cables beneath the seabed through tunneling, trenching or other means of cable protection. Specifically, the objective of the geotechnical program was to obtain detailed subsurface data for the feasibility study and design of the subsea tunneling option.



Stantec services included assistance with development of geotechnical drill tenders, geotechnical drill contractor evaluation (on site interviews and equipment inspection), field supervision and inspection of drill operations, permeability testing, detailed core logging, bedrock core photography, rock testing in field laboratory, coordination and completion of laboratory advanced testing and associated reporting. Continuous drill supervision was carried out for sites on both the Newfoundland and Labrador coasts of the Strait of Belle Isle. Six oriented boreholes were advanced to a maximum length of 955 m at inclinations of 75 – 30 degrees. Supervision involved monitoring on-site activities, recording drilling parameters, collecting core samples and water, taking high quality photographs of the core, transferring core to storage facility and liaising with the client's technical advisor.
Field procedures were modified on the Labrador side boreholes to accommodate the possible presence of gas release through the drill casing. This included the use of methane gas monitor devices onsite. Field testing included permeability testing, point load testing and Schmidt

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hammer hardness testing. Stantec provided both standard as well as detailed geotechnical core logging for the Q-Method. After logging, select samples were identified for laboratory testing at Stantec's facilities in Dartmouth, Nova Scotia. Stantec completed all associated reporting on these services for contribution to the final program report.

4. Project Name: Nanisivik Naval Facility Project, Baffin Island, Nunavut
Client: Defence Construction Canada
Client Contacts: Rodney Watson, P.Eng., PMP Project Manager, Directorate Construction Project Delivery, National Defence,101 Colonel By Drive, Ottawa, ON, K1A 0K2, [redacted] (ph), rodney.watson@forces.gc.ca (email).

Stantec conducted a geotechnical investigation for the proposed Nanisivik Naval Facility and provided recommendations to assist with design of the naval facility. The proposed station will provide berthing for vessel fuel and supplies as well as staff accommodations.



Stantec completed a desk study in 2010 to review previous investigations, inspection reports and drawings for the existing dock to infer geotechnical properties for use in foundation and stability analysis. Following this study, we provided recommendations for additional field work and geotechnical analysis. The geotechnical program included boreholes for the dock reconstruction, an upland geotechnical investigation for a proposed tank farm and facility infrastructure, plus reconnaissance for local borrow materials.



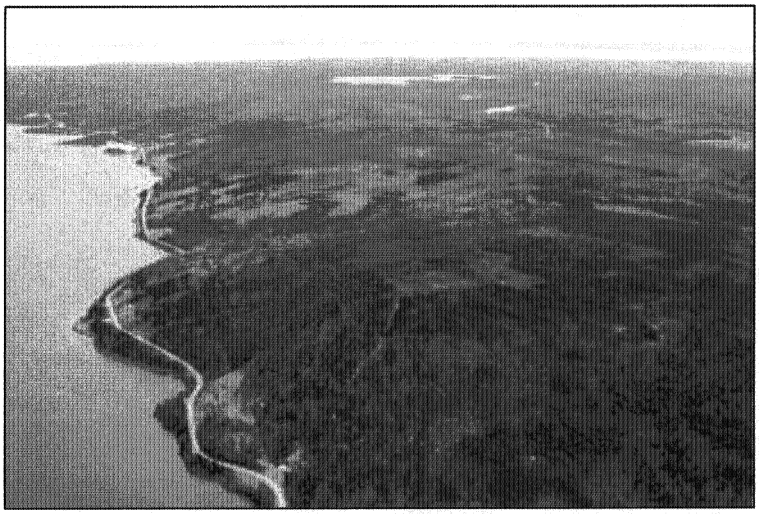
Stantec completed two geotechnical field programs in August and September of 2010 and 2011. Fieldwork consisted of drilling boreholes to depths of 81 meters on land, and 35 metres on the water. Test pits were also excavated as part of a search for borrow materials. Project challenges included difficult drilling conditions due to permafrost, presence of coarse grained soils and a stipulation that drilling mud could not be used due to environmental concerns. Additionally, logistics were complex for mobilization of land and marine plants in a remote northern site.

Based on the findings of the geotechnical investigation and subsequent analysis, Stantec prepared a final report that provided recommendations for design and construction of the proposed naval facility. Recommendations were made concerning existing wharf movements, options for wharf improvement, foundation design in the upland areas, and seismic considerations.

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5. Project Name: Marine Container Terminal and Access Corridors, Melford Point, NS
   Client: Melford International Terminal Inc.
   Client Contacts: Mr. Carmen D'Intino, P.Eng. and Mr. Hugh Lynch, 1201-1809 Barrington Street, Halifax, NS B3J 3K8, 902-482-9993 (ph), 902-468-3532 (fx).

In 2008 Stantec completed a comprehensive land and marine based geotechnical investigation on behalf of Melford International Terminals Inc. to support design of a proposed intermodal international container terminal located within and adjacent to a large industrial reserve at Melford Point along the Strait of Canso in Nova Scotia.



Stantec was retained to explore and assess the subsurface soil, bedrock and groundwater conditions and to provide geotechnical recommendation to assist with design of the various elements of the facility including a 1 km marginal wharf, terminal yard area, logistics park and rail access route.
The geotechnical investigation comprised an extensive program of field work, laboratory testing and office studies. Office study included review and incorporation of an early 1970s subsurface assessment conducted at the site for a proposed oil refinery.
Overall a total of 6 marine boreholes, 36 land based boreholes and 72 test pits were completed for the various elements. The land based borehole depths were up to 35m and the marine based borehole depths up to 45 m below the mudline. The marine boreholes were completed in up to 17 m of water with a CME 75 geotechnical drill mounted on a 26 m x 8 m spud barge. The total length drilled for the marine boreholes was approximately 140 m. In conjunction with the marine geotechnical program, Stantec also conducted a sampling, testing and assessment program of marine sediments for environmental purposes. Marine samples were collected over the side of the barge using a VanVeen sampler.
Our geotechnical report included soil, rock and groundwater design parameters along with detailed recommendations on dredging, concrete cribs and piled structures for the front face of the wharf, backland in-filling, building foundations, bridge foundations and roadway and yard earthworks and pavements.

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APPENDIX 3; STANTEC RELEVANT MARINE HABITAT AND ARCHEOLOGICAL EXPERIENCE

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Stantec has completed numerous underwater benthic habitat surveys supporting various infrastructure developments in Atlantic Canada including:

- ***Tufts Cove Infill, Halifax Harbour, Nova Scotia (Millbrook First Nation) 2016 – Present***

  Stantec provided environmental support for the infilling of Tufts Cove in Halifax Harbour. Stantec Conducted a CEAA screening and Fisheries Act Authorization for the project. As part of the Fisheries Act Authorization process, Stantec collected underwater video to complete an underwater benthic habitat assessment and habitat modeling report for the Project Area.

- ***Numerous Fisheries and Oceans Canada – Small Craft Harbour (DFO-SCH) Harbour Upgrade Projects***

  Stantec has been and is currently retained by PWGSC on a Standing Offer Arrangement to provide environmental services. We have provided environmental support in relation to numerous harbour upgrade projects throughout Nova Scotia on behalf of DFO – SCH. As part of the *Fisheries Act* Authorization process, Stantec collected underwater video to complete underwater benthic habitat assessments for these projects and to delineate the presence of eelgrass seabeds.

- ***Fairview Cove Infill (Halifax Port Authority) 2015 -2016***

  In support of a CEAA screening and Fisheries Act Authorization Stantec collected underwater video imagery with a ROV to complete an underwater benthic habitat assessment of the proposed infill area. Benthic habitat was assessed for substrate type, macroflora, and macrofauna within the Project Area.

- *Donkin Mine Habitat Assessment, Cape Breton, Nova Scotia (Xtrata Coal) 2011-2013*

  Stantec conducted the environmental assessment for the Donkin coal mine in Cape Breton, NS which included field studies to characterize and quantify the marine habitats in the footprints of the coal barge load-out and offshore transshipment site facilities. The studies included an ROV survey along marked transects laid on the seabed and a tow-operated underwater video camera to assess the benthic habitat, flora and fauna within the area. Stantec prepared a fish habitat report which was submitted to DFO for their determination of the HADD by the marine infrastructure for the project.

- *Maritime Link Project – Nearshore Marine Environmental Technical Studies at the Cable Landfall and Potential Grounding Sites in Newfoundland and Nova Scotia (Emera Newfoundland & Labrador Maritime Link Inc.) 2011-2012*

  Stantec was mandated by ENL Maritime Link Inc., now NSP Maritime Link Inc., to undertake the nearshore marine environment studies for the Maritime Link Project and to support the Environmental Assessment Screening Report. Field work consisted of characterization at a high level of the backshore, shoreline, intertidal zone, and the subtidal marine benthic habitat with respect to substrate type and the distribution of macroflora and macrofauna species observed. Underwater marine observations were conducted with a ROV or tow-operated video camera along pre-determined potential routes on the seabed of the subsea cable corridor in both the nearshore environments of Newfoundland and Nova Scotia. Water column profiles and sediment samples for physico-chemical analysis were collected to characterize these coastal areas. Characterization of marine fish and fish habitat in relatively shallower environments (maximum 6 to 7 m water depth) at 7 potential locations for a marine grounding site in Cape Breton, Nova Scotia, and 6 potential locations for a grounding site in Newfoundland. Single-beam echo sounding surveys and the production of

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bathymetric maps were also carried out at each of two grounding sites in both Nova Scotia and Newfoundland.

- *Sydney Harbour Access Channel Deepening and the Proposed Sydport Container Terminal (Sydney Marine Group) 2008 -2014*

  Stantec was the lead consultant for the environmental assessment and environmental permitting for the Sydport Marine Terminal and channel dredging at Sydney Harbour, Nova Scotia. Marine survey work undertaken during the environmental assessment process included benthic fish habitat video surveys, sediment sampling and analyses, and a geotechnical borehole investigation program. Subsequent marine survey work carried out in support of fish habitat compensation planning included collection of baseline information to provide further characterization of habitat to be affected by the Project, identify the best sites and methods for habitat enhancement, and to support future monitoring of the effectiveness of HADD compensation projects implemented by the Proponent.

- *Dredge Pile Research and Development Program, Newfoundland (PRNL)2013-2015*

  Stantec conducted ROV surveys in radial transects on dredge pile and reference areas on the grand banks 200 nm from Newfoundland. Video transects were recorded using a ROV coupled with a locator beacon and HIPAP positioning to accurately correlate video feed with GPS location along the dredge pile in order to gather baseline information for the purpose of mapping sediment repopulation after severe habitat disturbance. Designed and constructed underwater cage for mini ROV, and conducted sediment sampling in conjunction with video to plot population levels of benthic fauna.

- *Habitat Characterization, Quantification, and Utilization of the Marine Environment in Argentia Harbour Newfoundland (Husky Energy) 2011-2013*

  As part of the selection process for suitable areas for gravity base structure (GBS) construction, Stantec provided a detailed underwater survey in Argentia Newfoundland. The survey included a series of ROV surveys conducted along transects in Argentia Harbour to delineate the habitat type and fauna/flora distribution, in particular, eelgrass bed distribution and densities. In addition to the habitat survey, a detailed video survey was conducted (approx. 8000 m in length) to assess the bottom type, slopes, and habitats encountered along the GBS tow-out corridor in preparation for possible dredging activities. Along with the ROV data, detailed shoreline surveys were collected and correlated with the underwater video transect locations.

- *Hebron Oil and Gas Project – Marine Habitat Survey and Fish Habitat Compensation Strategy (Exxon Mobil Canada Properties (EMCP)) 2010 – 2011*

  In addition to Stantec managing and coordinating the preparation of the Hebron comprehensive study report and socio-economic impact statement (submitted June 2010) and the responses to comments for ExxonMobil Canada Properties, Stantec was mandated to conduct the marine habitat utilization and fieldwork at Bull Arm, Trinity Bay, Newfoundland. Stantec conducted field studies including a detailed and quantitative fish and fish habitat assessment for an area approximately 712,000 m^2 with an ROV that surveyed along geo-referenced transect ropes placed on the seabed and marked at every 10-m increments. The main purposes of this survey was to characterize the existing fish and fish habitat in the footprint of the nearshore project activities, which included infilling, dewatering, dredging and spoil disposal activities as well as to provide baseline information for the assessment of potential harmful alteration, disruption, or destruction (HADD) of fish habitat, and ultimately habitat compensation.

- *Confederation Bridge, Northumberland Strait, Prince Edward Island (Strait Crossing Incorporated)1994-1999*

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Prior to and during the construction of the confederation bridge between Prince Edward Island and New Brunswick, Stantec conducted detailed habitat assessments using underwater video surveys. ROV data were collected along with dive surveys to chart and monitor habitat flora and fauna in situ. Statistical analysis of data was carried out along with GPS analysis/mapping for spatial presentation. In addition to ROV and dive surveys, ADCP surveys, tide gauge surveys, physical and chemical oceanographic surveys and sediment sampling were also conducted each year, and correlated to video surveys to show both spatial and temporal relationships during bridge construction in Northumberland Strait as well as habitat stabilization after bridge construction activities were completed.

Below are select examples of Stantec's experience of relevance to archaeological projects.



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PROPOSED WORK SCOPE
CARIBOU PIPELINE ROUTE

Marine Geotechnical/Harbour Bottom Video Investigation RFQ 10-1113-A000-003031

Submitted To:

Hugh MacDougall
Tom Dewtie
Northern Pulp NS Corp.

Prepared by:

CSR GeoSurveys Ltd.
341 Myra Road, Porters Lake
Nova Scotia, Canada B3E 1G2
Telephone: 902-827-4200
Email: [redacted]

and

Stantec

Stantec Consulting Ltd.
Dartmouth NS

CSR Job Number: 1806

Date: Oct 10, 2018

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1.0 INTRODUCTION

The route shown in Fig. 1 is an example of the route centreline for a 200m survey swath from the shoreline to the diffuser. We have alllowed at least a 100m buffer from the Ferry navigation channel. An expanded area around the diffuser location of 400x400m will be surveyed.

Note the shoals around Big Caribou Entrance just south of Gull Spit. These will require survey at high tide only and may require a smaller boat.

A small [redacted] Ice Scour survey is also proposed in water depths deeper than 5m. We also recommend a Spring Breakup Ice Scour survey with multibeam survey to assist with burial depth derterminations.

For the habitat survey, Sam Sally of Stantec and I agree that the control areas can be found within the 200m corriodor. The same approach side scan and [redacted] video camera will be used.

Today, we will submit prices to Tom Dewtie for the Geophysical component. Geotechnical prices will follow as we get those firmed up. Note, we are proposing 3m deep cores.

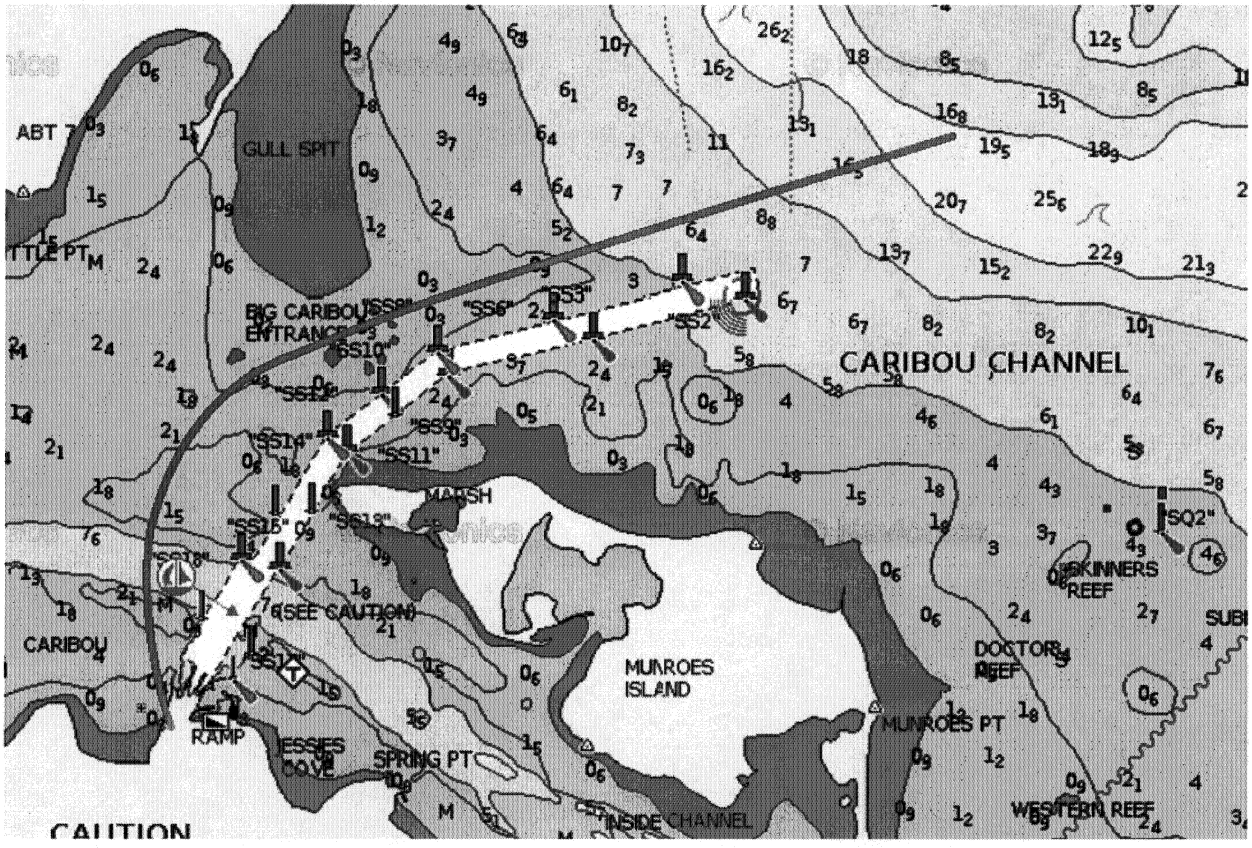


Fig 1. Example Pipeline route giving [redacted] m or more clearance from navigation channel

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1.0 GEOPHYSICAL MAPPING OF THE SITE

To include;

[redacted]

Days

[redacted]

Map route back in the office

[redacted]

2.0 VIDEO HABITAT MAPPING OF THE SITE

[redacted]

Habitat study; Camera and grab samples along final route

Demob boat for return to CSR

[redacted]

3.0 ARCHAEOLOGY REVIEW OF VIDEO AND SIDE SCAN

office work

4.0 GEOTECHNICAL [redacted] AT THE SITE

[redacted]

Days

Mob to site
Operations
Demob from site

[redacted]

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5.0 PROPOSED SCHEDULE

Northern Pulp
Marine Geotechnical/Harbour Bottom Video Investigation RFQ 10-1113-A000-003031
Tentative Project Schedule for the New Caribou Site

Task	Week 1	2	3	4	5	6	7	8	9	10	11
Contract Award											
Survey Preparation											
Video Plan Submitted to KSH and DFO											
Prepare Equipment & Mob to survey site											
Marine Geophysical & Video Survey											
Conduct Sidescan and Ground Truth Survey											
Small Ice Scour Program											
Survey											
Compile sidescan mosaic for habitat planning, review data for best pipeline routing, select pipeline route approved by Client											
Survey over final route alignment. Survey Landfall											
Mob/Conduct camera, survey over final route alignment and habitat sites											
Demob boat and return to CSR											
Marine Geotechnical Survey											
Mobilization Geotech vessel to site											
Geotech Ops on final route alignment											
Demob all gear and personnel from site											
Processing, Interpretation & Reporting											

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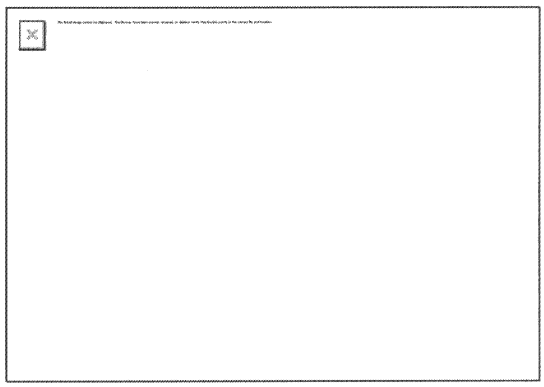
Wambolt, Michael

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: October-18-18 2:25 PM
To: Jalloh, Rugi; Wambolt, Michael; Smith, Colleen A
Subject: NPNS meeting notes for Thursday
Attachments: October 18 2018 Meeting with NSE (Caribou Outfall)_V4.pdf; ATT00001.htm

Hi Rugi,

Please see attached the presentation from today. We really appreciate your team meeting with us this morning.

Regards,
Terri



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NOVA SCOTIA CORPORATION
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Northern Pulp's Effluent Treatment Facility Replacement Project

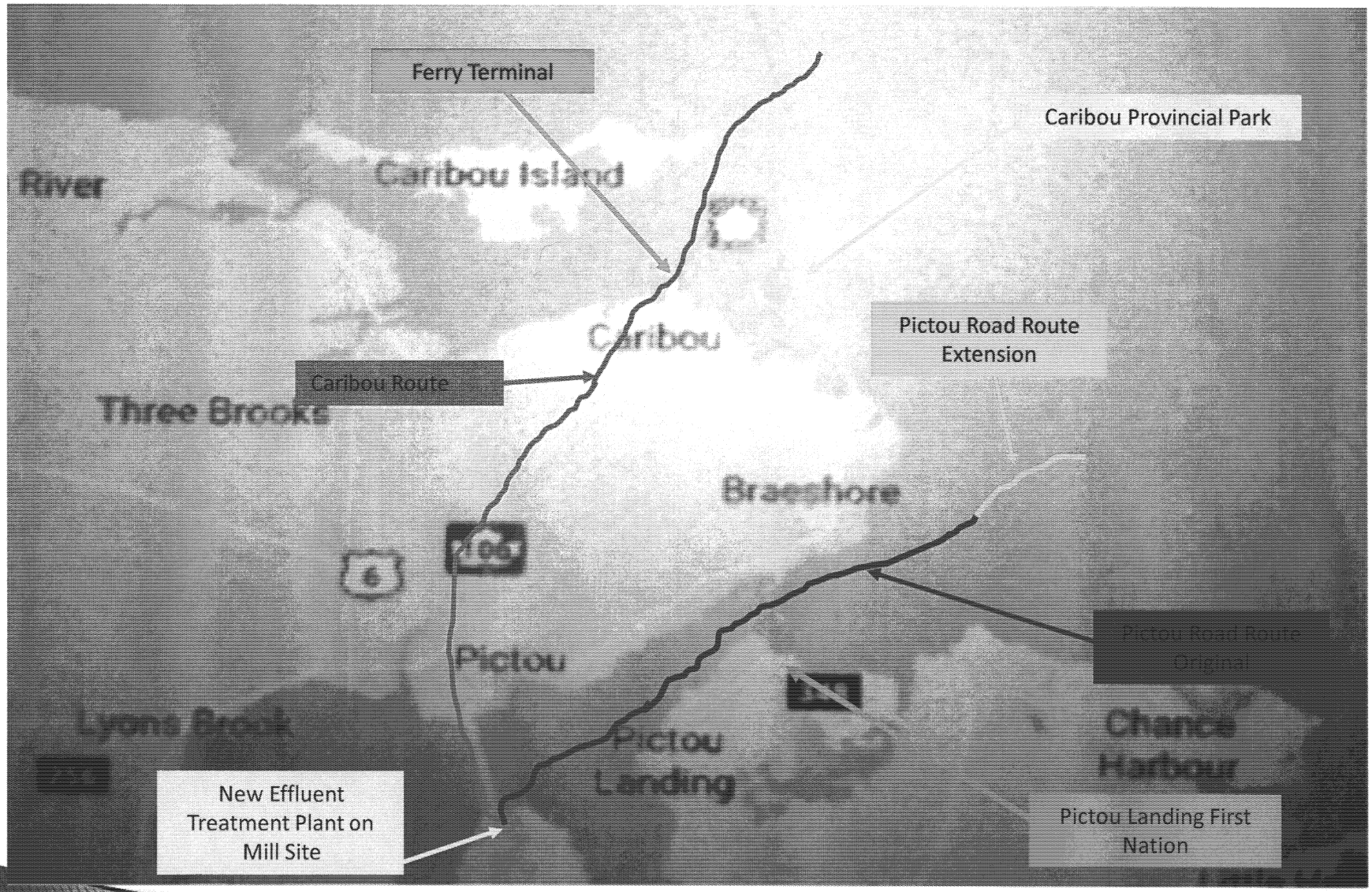
October 18, 2018

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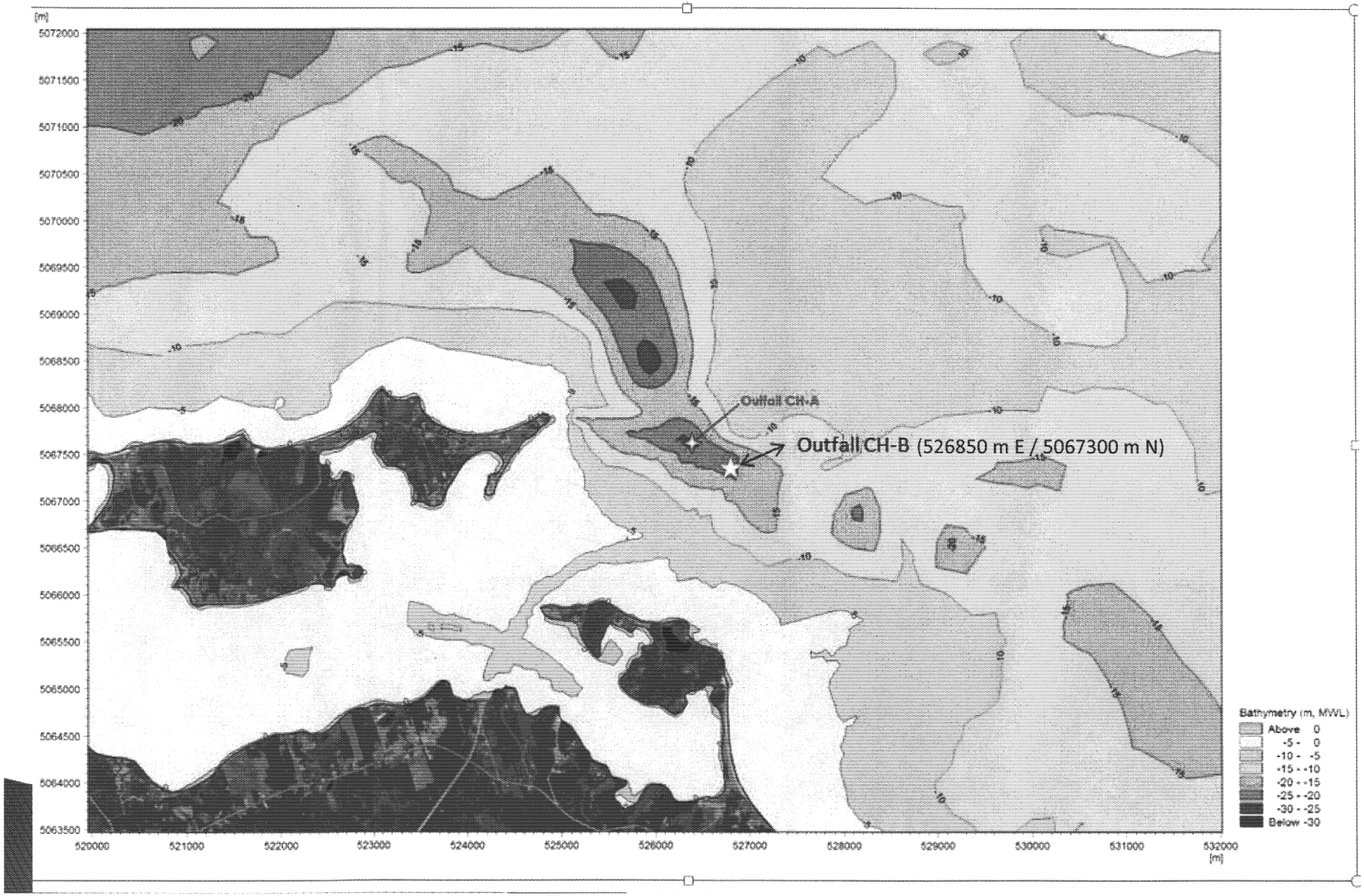
Treated Effluent Discharge Options Considered



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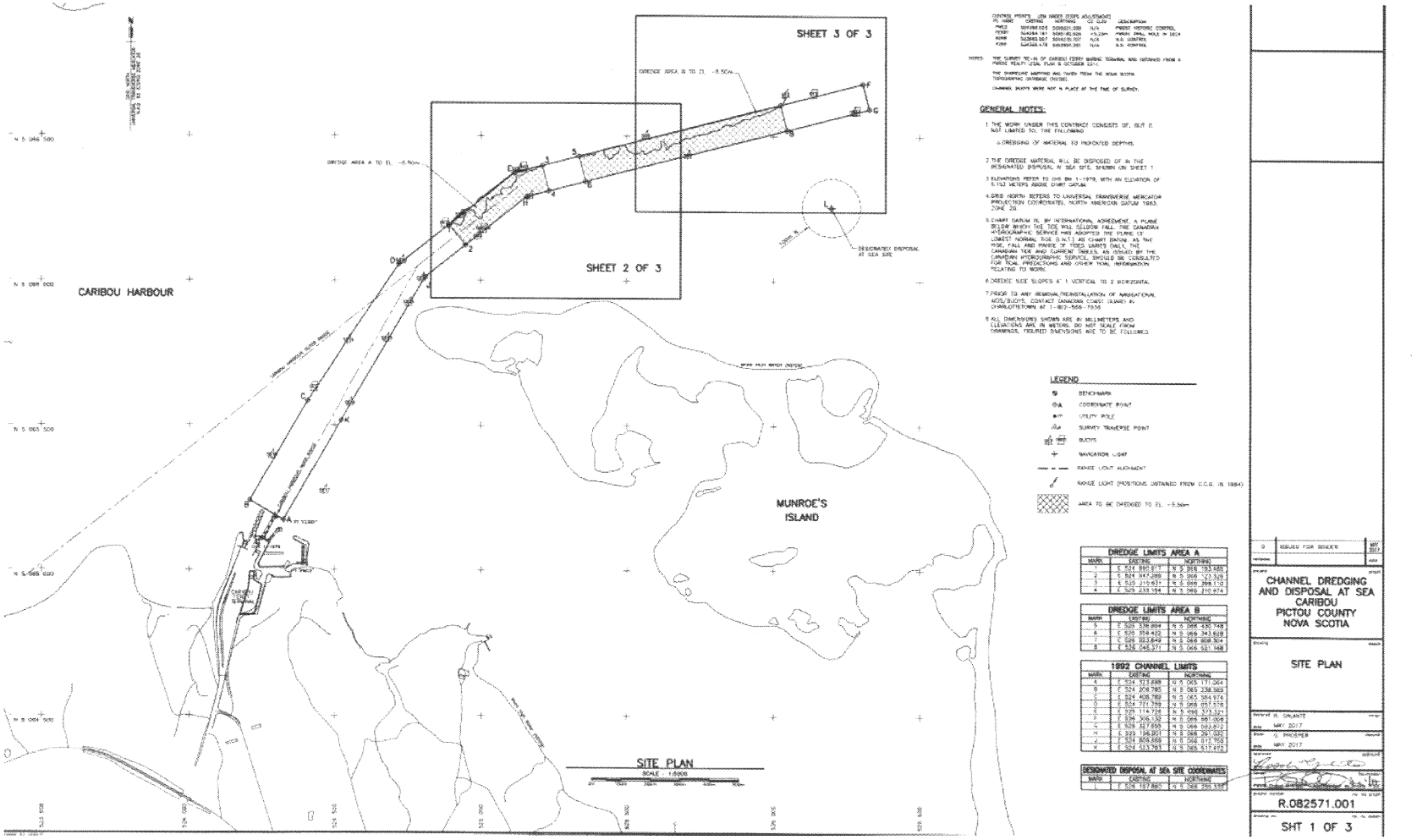
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Alternative Proposed Caribou Outfall Location



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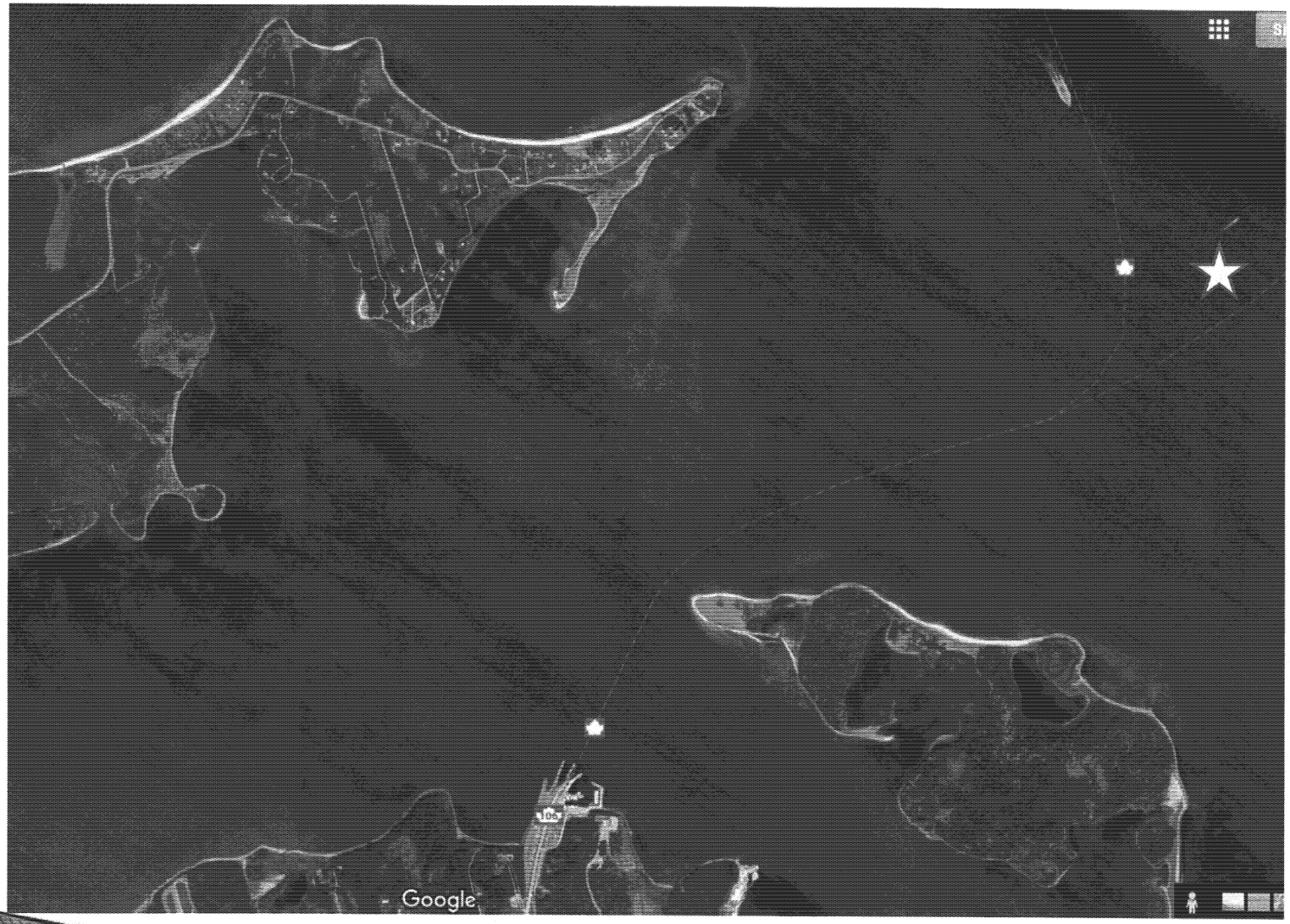
Caribou Ferry Dredge Channel



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Caribou (CH-B) Outfall Location

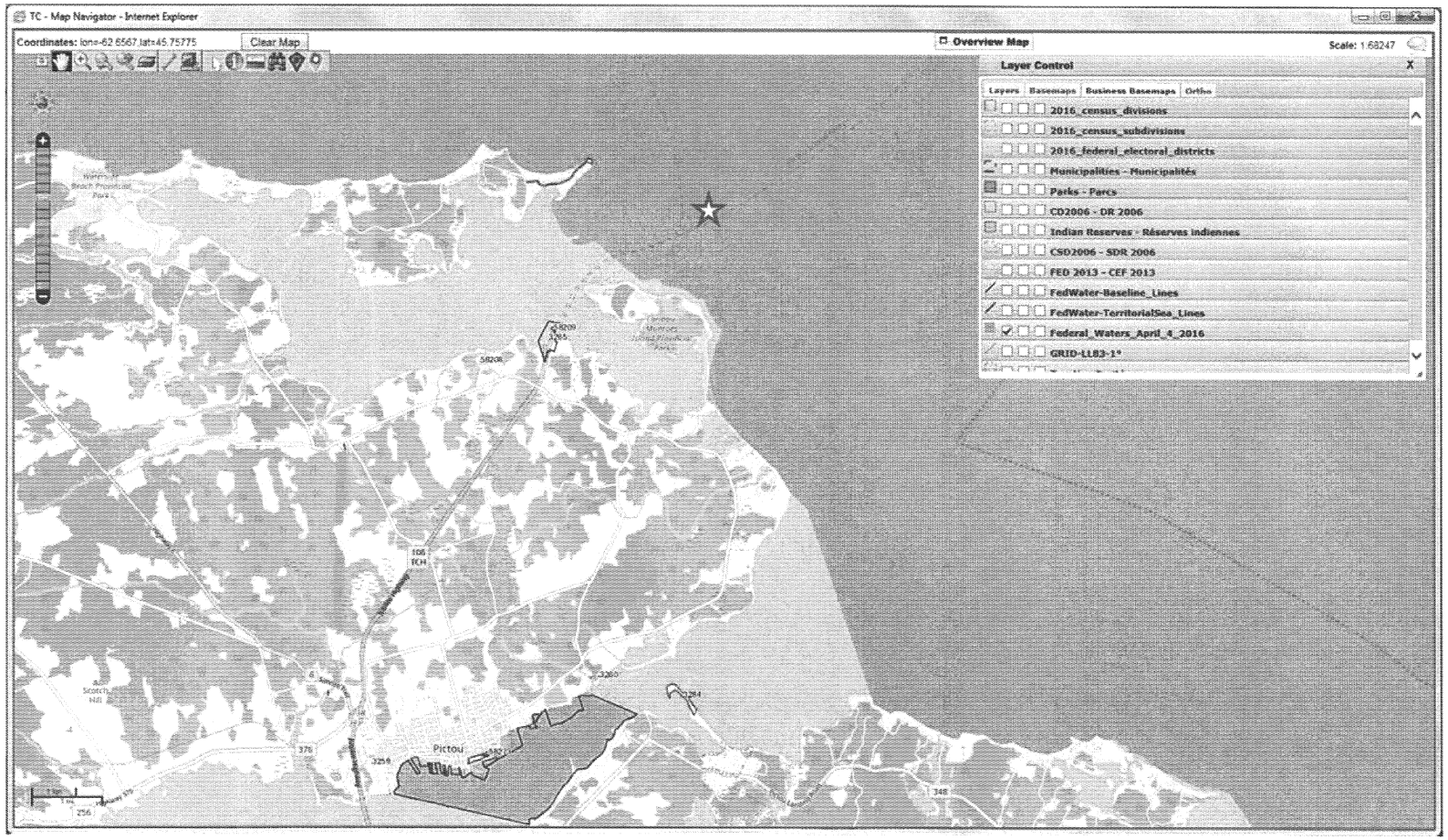


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Caribou (CH-B) Outfall Location

Outlining Location of Federal Waters



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Water Quality Characteristics used in RWS

Change in Nitrogen Value

- Same parameters used for Caribou receiving water study as previous RWS; except for nitrogen
- Lab testing shows a Total Nitrogen value of 6 mg/l in the treated effluent; versus 3 mg/l in the original RWS
  - This was confirmed through working with the vendors that bid on the ETF system
- New seawater samples in Caribou are being tested to develop the distances required for the plume to meet background conditions

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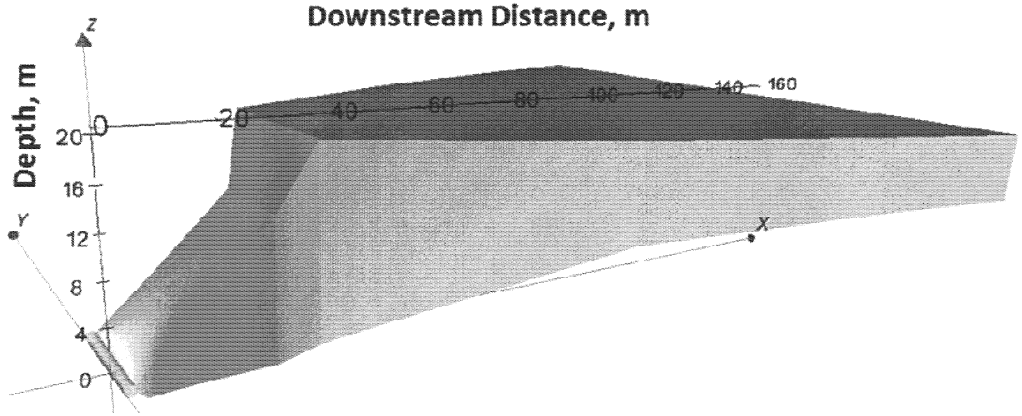
Results: CH-B (Caribou) and ALT-D (Pictou Road)
Dilution Factor within Mixing Zone

Scenario	Distance from Diffuser and Dilution Factor					
	5 m	10 m	20 m	50 m	100 m	200 m
Caribou - Single Port Diffuser	2.6	5.6	16	69	78	87
Caribou - Three Ports Diffuser	**55**	**78**	**109**	**141**	**168**	**176**
Caribou- Six Ports Diffuser	81	113	159	247	297	329
Alt-D Pictou Road – Six Ports Diffuser	**36**	**41**	**51**	**77**	**109**	**136**

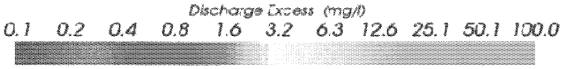
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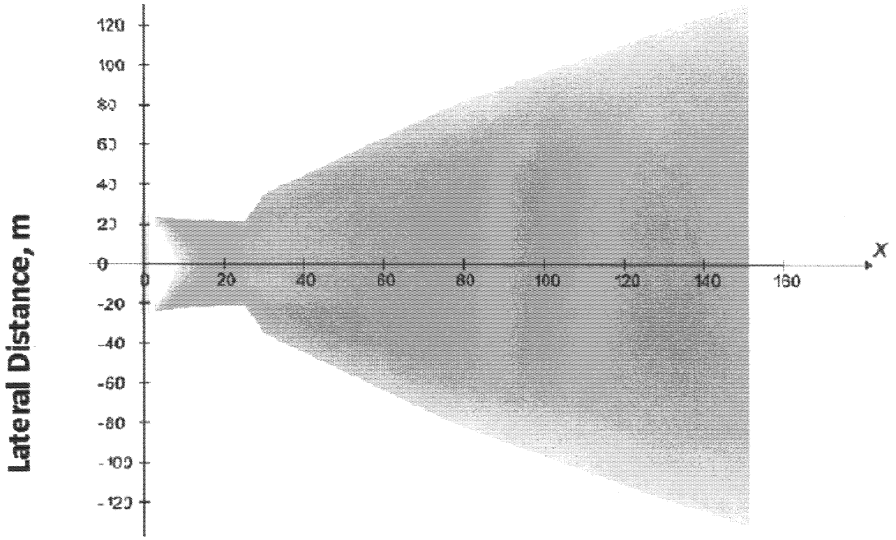
Caribou (CH-B): 3-Port Discharge

Side View



Port Diameter 0.3 m
Discharge velocity 4.6 m/s



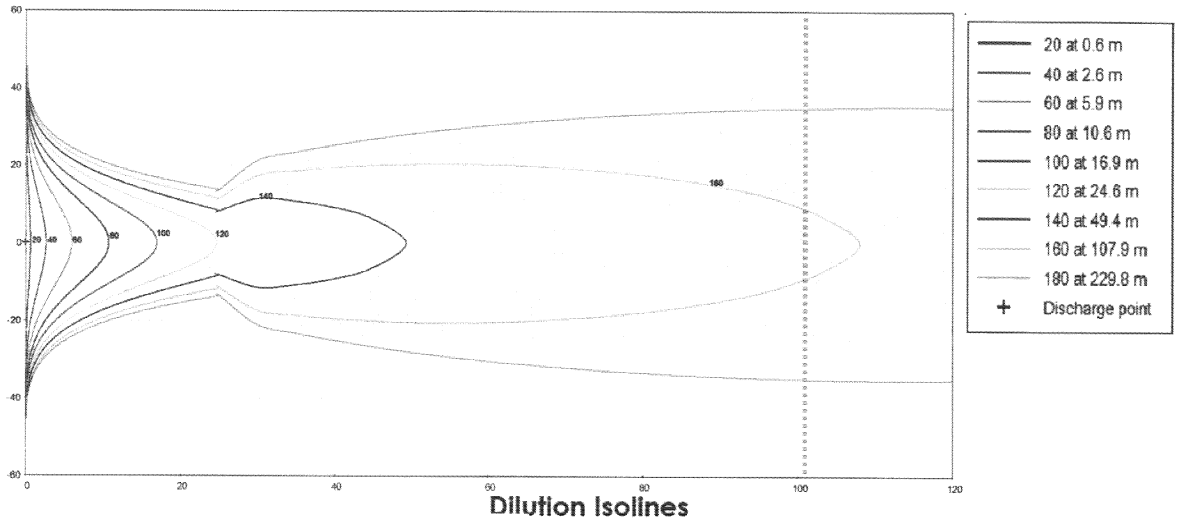


Refer to Figure 3-4 of the Stantec RWS (August 11, 2017) for comparison to Alt-D 6 port diffuser at Pictou Road

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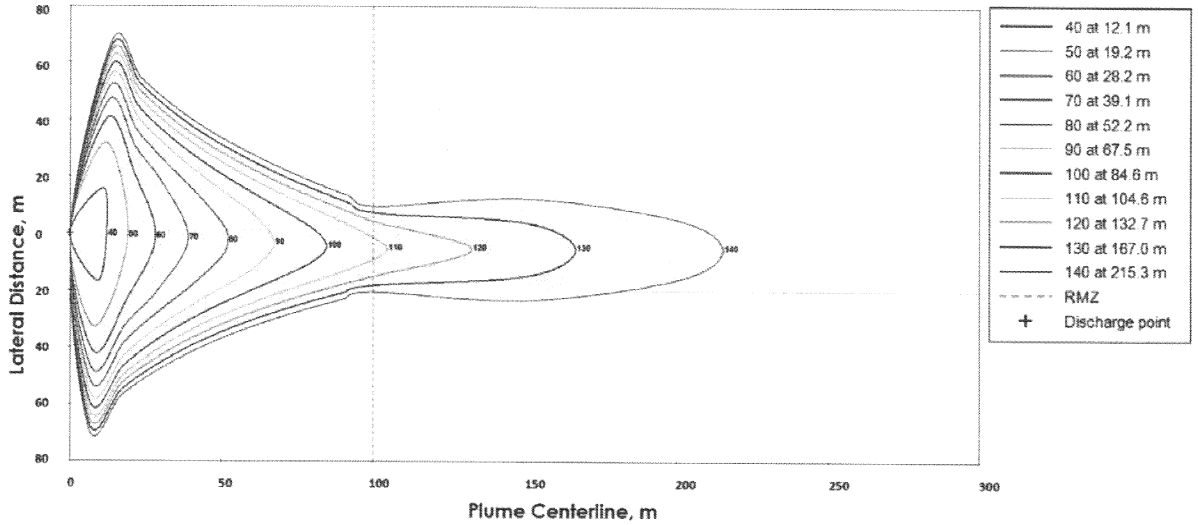
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Caribou (CH-B) 3-Port Diffuser vs Alt-D 6-Port Diffuser



Caribou 3 Port Diffuser

Alt-D Pictou Road 6 Port Diffuser



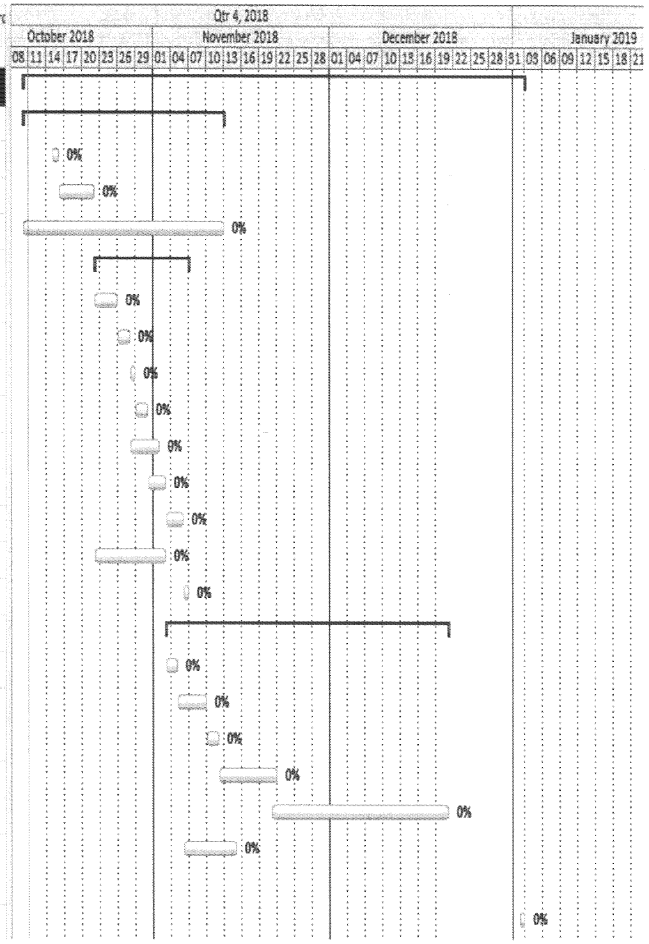
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Schedule for Marine Surveying for Caribou Outfall

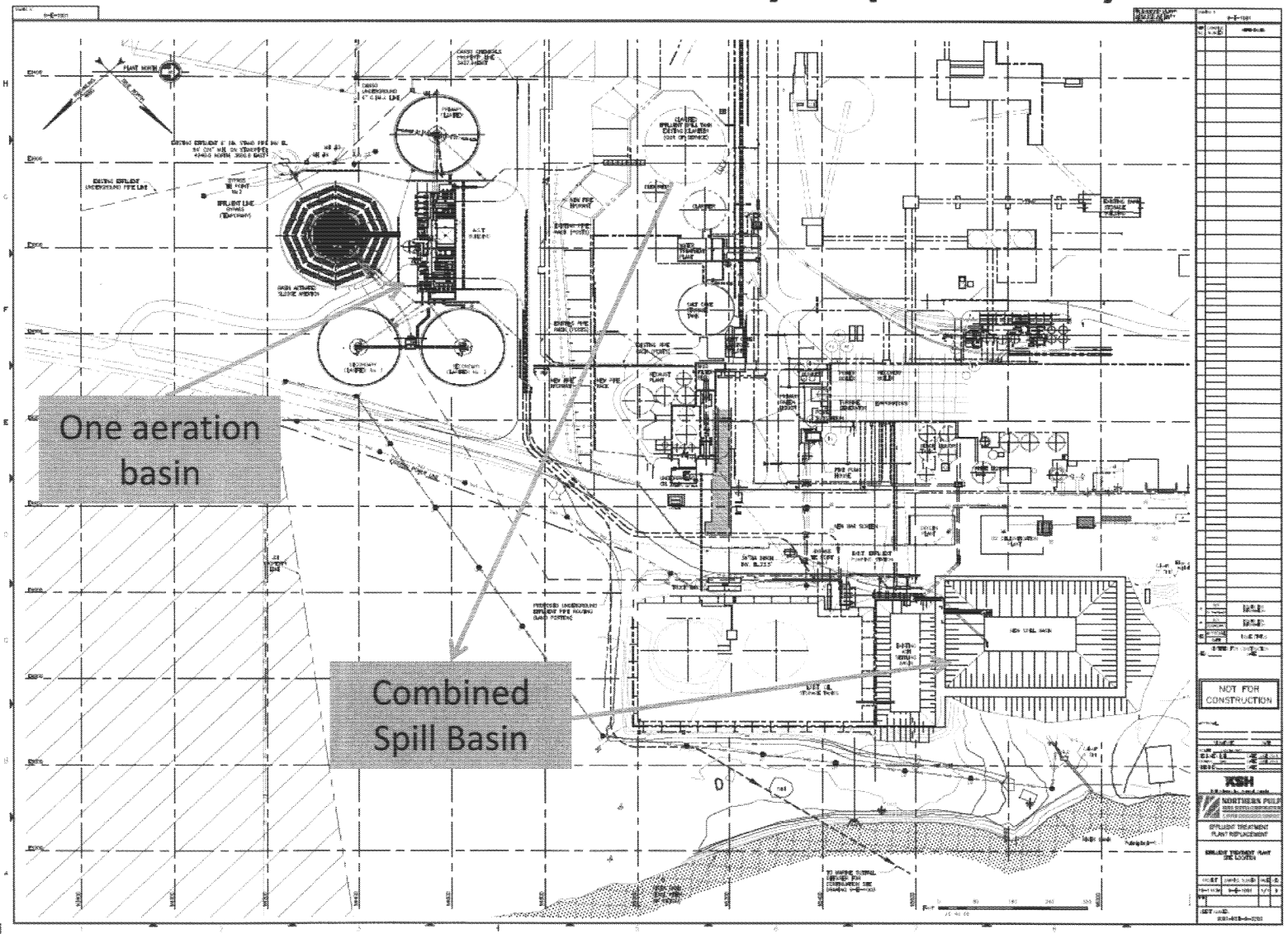
	Task Name	Duration	Start	Finish	Predecessors	Resourc
46	Marine Survey	55 days	Wed 10/10/18	Wed 02/01/19		
47	**Preparation**	**26 days**	**Wed 10/10/18**	**Mon 12/11/18**		
48	Video plan submitted for approval	1 day	Mon 15/10/18	Mon 15/10/18		CSR
49	Mob to Site	6 days	Tue 16/10/18	Sun 21/10/18	48	CSR
50	Dock Rental, Security, Reefer	26 days	Wed 10/10/18	Mon 12/11/18	48SS-3 days	
51	**Geophysics & Video**	**12 days**	**Mon 22/10/18**	**Tue 06/11/18**		CSR
52	[redacted]	4 days	Mon 22/10/18	Thu 25/10/18	49	CSR
53		2 days	Fri 26/10/18	Sat 27/10/18	52	CSR
54		1 day	Sun 28/10/18	Sun 28/10/18	53	CSR
55		2 days	Mon 29/10/18	Tue 30/10/18	54	CSR
56		5 days	Sun 28/10/18	Thu 01/11/18	53	CSR
57		3 days	Wed 31/10/18	Fri 02/11/18	55	CSR
58		3 days	Sat 03/11/18	Mon 05/11/18	57	CSR
59		12 days	Mon 22/10/18	Fri 02/11/18	52SS	CSR
60		1 day	Tue 06/11/18	Tue 06/11/18	58	CSR
61	**Geotechnical**	**34 days**	**Sat 03/11/18**	**Thu 20/12/18**		CSR
62	[redacted]	2 days	Sat 03/11/18	Sun 04/11/18	57	CSR
63		5 days	Mon 05/11/18	Fri 09/11/18	62	CSR
64		2 days	Sat 10/11/18	Sun 11/11/18	63	CSR
65		10 days	Mon 12/11/18	Wed 21/11/18	64	CSR
66		30 days	Wed 21/11/18	Thu 20/12/18	65FS-1 day	CSR
67		7 days	Tue 06/11/18	Wed 14/11/18	63SS+1 day	
68		1 day	Wed 02/01/19	Wed 02/01/19	66	



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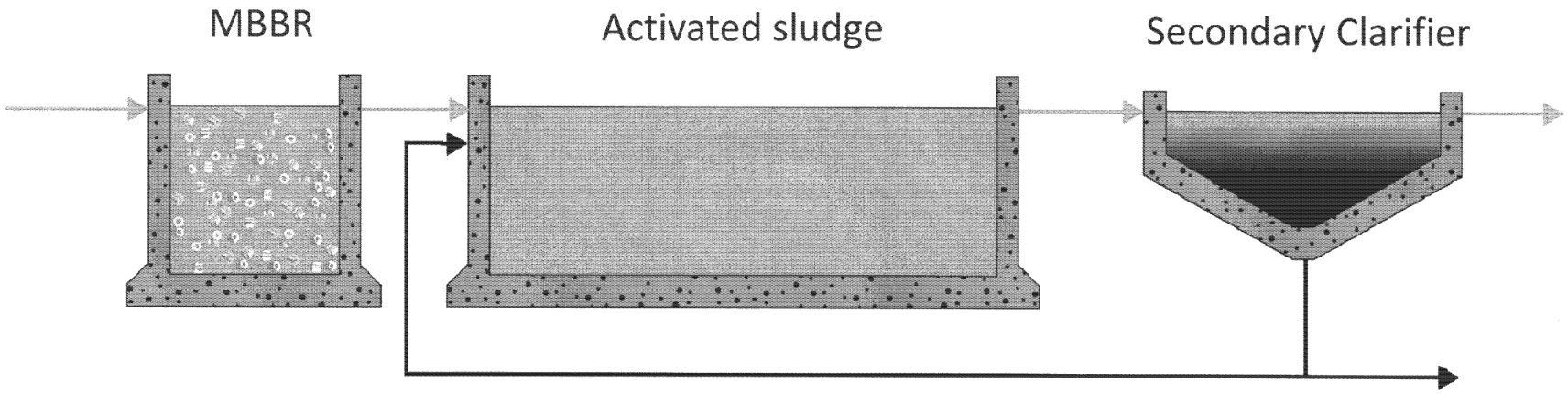
NPNS Effluent Treatment Facility –updated layout



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Veolia (Sweden) MBBR/Activate Sludge Process Chosen



- Removal of majority of BOD in a small volume
- Protects activated sludge from disturbances
- Removal of remaining BOD at low load
- Secures maximum removal of COD and low sludge yield

The AnoxKaldnes™ BAS™ process

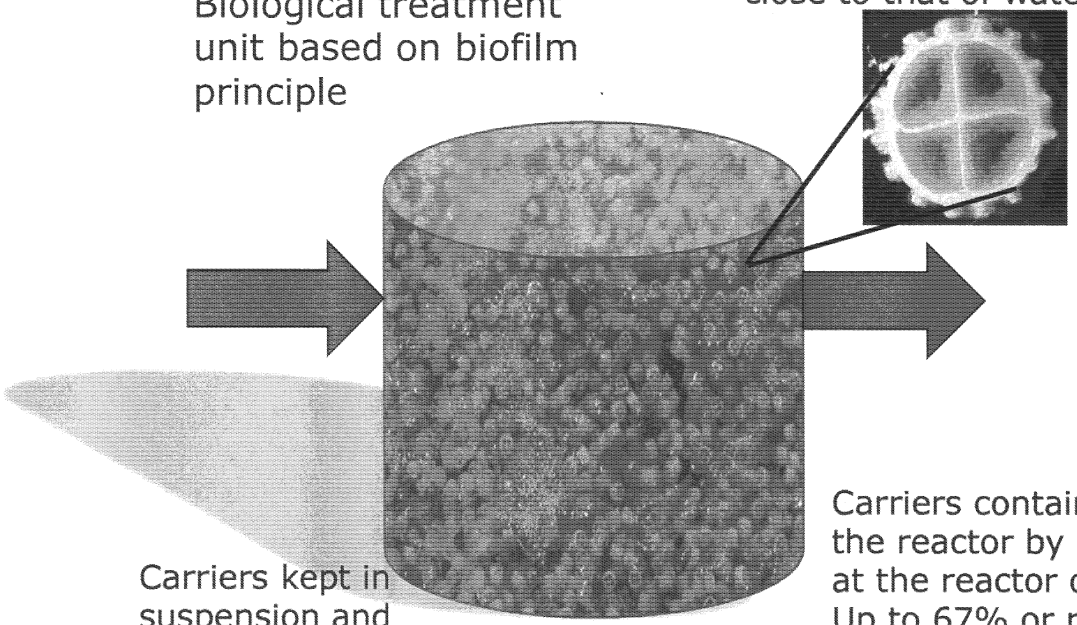
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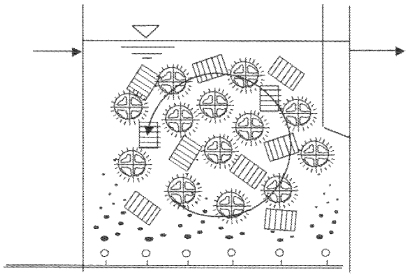
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The BAS biological process - MBBR

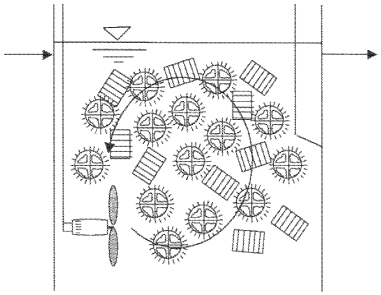
Biological treatment unit based on biofilm principle

Key component is carrier in polyethylene with large surface area and a density close to that of water





Aerobic reactor



Anoxic reactor

Carriers kept in suspension and continuous movement by aeration or mechanical mixing

Carriers contained in the reactor by sieves at the reactor outlet. Up to 67% or reactor volume can be filled with carriers.

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Thank You!

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Smith, Colleen A

From: Salley, Sam <Sam.Salley@stantec.com>
Sent: October-19-18 5:29 PM
To: Smith, Colleen A; Jalloh, Rugi
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com)
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hi Colleen,

Thanks for looking into this while Rugi is away. If it is like other similar work that we have done in the past for PWGSC, wouldn't Troy have the marine sediment sampling report? It might be easier for DFO to obtain this report than us.

Have a great weekend,

Sam

From: Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Sent: Friday, October 19, 2018 4:08 PM
To: Salley, Sam <Sam.Salley@stantec.com>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com) <terri.fraser@northernpulp.com>
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hi Sam,

Rugi is away for the next week so I will look into this for you. I can't seem to find the marine sediment sampling program on the file, however, this is an Environment Canada mandate so we may not have it.

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Salley, Sam [mailto:Sam.Salley@stantec.com]
Sent: October-18-18 4:38 PM
To: Jalloh, Rugi
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com); Smith, Colleen A
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hi Rugi,

Thank you for the providing the PWGSC (2015) CEPA assessment, which contains very useful summary information.

Would there be a chance we can get a copy of the following reports cited and which would likely have more detail and be quite relevant?

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AMEC. 2014. Ocean Dredging Disposal Site Stability and Dispersion, Caribou Ferry Terminal, NS. Report prepared for: Public Works and Government Services Canada, Halifax, NS.

AMEC. 2015. Fisheries Habitat Survey at the Disposal at Sea Site near the Transport Canada Ferry Terminal in Caribou, Nova Scotia.

AMECFW. 2015. Marine Sediment Sampling Program, Transport Canada Ferry Terminal in Caribou, Pictou County, Nova Scotia

Transport Canada. Atlantic Region 2008. Environmental Assessment Screening Report - Channel Re-Dredging and Land-based Disposal, Caribou Ferry Terminal, NS

Thank you again for your assistance.

Kind regards,

Sam

Sam Salley, M.Sc.
Principal, Senior Marine Scientist

Direct:
Mobile:
Fax: 902-468-9009

Stantec Consulting Ltd.
102-40 Highfield Park Drive
Dartmouth NS B3A 0A3 CA

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From: Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>
Sent: Thursday, October 18, 2018 2:39 PM
To: Salley, Sam <Sam.Salley@stantec.com>
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com) <terri.fraser@northernpulp.com>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: Northern Pulp NS - Caribou dredging - Impact Analysis

Hello Sam,
Please find attached report, hope you find it useful. Let me know if you need any other information. Also, feel free to contact our colleagues in the Gulf Region.
Thanks,

Ms. Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
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file copy
19.10.18 RR

Thank you Mr. Chairman and good morning to all members of the Provincial Standing Committee on Agriculture and Fisheries.

My name is Ian MacPherson and I am the Executive Director of the Prince Edward Island Fishermen's Association. Today, I am joined by Marine biologist Melanie Giffin and PEIFA President Bobby Jenkins to address the important issue of the proposed effluent discharge pipe in the Northumberland Strait, from the Northern Pulp Mill in Abercrombie Nova Scotia.

Once again, the Prince Edward Island Fishermen's Association is pleased to present to this committee and we are appreciative that the committee understands the importance of issues facing our organization and more importantly the issues facing our captains who make their living on the water.

Many of us in this room attended the Standing Committee session with Northern Pulp representatives several months back and we appreciate the seriousness this issue was accorded by the Standing Committee.

Unfortunately, since that time very little has changed in terms of new technical options being pursued or any meaningful dialogue with either Northern Pulp or the Province of Nova Scotia taking place.

Our intent today is to give a brief update on what the PEIFA has done on this file over the past few months and also provide the committee with our most recent scientific update. This update was presented to members of the Canadian Environmental Assessment Agency (CEAA) on Tuesday afternoon of this week.

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The position of the PEIFA and the Northern Pulp Working group, which consists of the Gulf of Nova Scotia Fleet Planning Board, the Maritime Fishermen's Union, the Prince Edward Island Fishermen's Association and the Pictou Landing First Nation, has not changed.

No Pipe in the Strait is our collective mantra. We believe that other technical options exist to keep the mill operative but have not been pursued.

The mill response for some time now has been No Pipe No Mill.

It is important to be clear that the PEIFA and the working group support the closure of the Boat Harbour waste treatment facility by the agreed upon date of January 30th 2020.

We continue to be frustrated that valuable time is being wasted pursuing an option that is not suitable to Pictou Landing First Nation, our collective fishing communities or many of the residents and businesses in the Pictou area.

Our collective advocacy for a Federal Environmental Assessment is to ensure a comprehensive program is in place to assess a project such as this. This does not mean the PEIFA or the Northern Pulp Working group support the project proceeding. The predictions on how this system will operate are made with predictive modelling that is based on short time periods and limited data.

Over the past number of months the working group has engaged an environmental consulting company, retained legal services and engaged an advocacy organization in Ottawa to assist in communicating our message to all government departments that will be involved in an environmental assessment application.

The working group fishing organizations have provided both financial and volunteer resources. Quite simply, we are committed doing anything we can to change the proposed outcome.

Our organizations and Canadians need to know the proper checks and balances are in place to ensure projects that could potentially damage our world class Canadian seafood brand are not allowed to proceed.

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In conclusion, I would like to request that the committee call members of the Northern Pulp Working Group to present at a future Standing Committee meeting so that the concerns of the New Brunswick and Nova Scotia fishing communities are heard.

I would now like to call upon PEIFA Marine Biologist and Program Planner Melanie Giffin to walk the committee through a number of compelling scientific reasons as to why the proposed project should not proceed.

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file copy
18.10.18 RR

Gulf Nova Scotia Fleet Planning Board
44 River John Rd.
River John, NS , B0K 1N0

Pictou Landing First Nation
6533 Pictou Landing Road
Site 6 Box 55, RR#2
NS, B0K 1X0

Maritime Fishermen's Union
408 rue Main St.
Shediac, NB, Canada, E4P 2G1

PEI Fishermen's Association
420 University Avenue, Suite 102
Charlottetown, PE C1A 7Z5

RE: Request for Federal Environmental Assessment of Northern Pulp Nova Scotia Corporation's Effluent Pipe Project

Dear Ms. McKenna,

We the undersigned are writing to formally request that you, as Minister of Environment and Climate change, designate Northern Pulp Nova Scotia Corporation's proposed pulp mill effluent treatment project at Abercrombie Point, Nova Scotia, as one that requires a federal environmental assessment under the Canadian Environmental Assessment Act 2012. The proposed new effluent treatment facility includes a ten-kilometre pipe to discharge effluent from a bleached kraft pulp mill into the Northumberland Strait.

Subsection 14(2) of the Act states, in part, that you may order a federal environmental assessment for a project if, in your opinion, the project "may cause adverse environmental effects". We are confident that Northern Pulp's effluent treatment project may cause severe adverse environmental effects impacting multiple species. The following information is a short summary of the adverse environmental effects possible based on the proposed effluent release.

Furthermore, as explained below, we are confident that the anticipated negative impacts of the effluent project touch on several areas of federal legislative authority, namely: fish and fish habitat; aquatic species under the *Species at Risk Act*; changes that impact a province other than where the project is proposed (Prince Edward Island and New Brunswick); and impacts to the aboriginal rights of Pictou Landing First Nation.

Northern Pulp's proposed effluent treatment project will pipe 70-90 million litres of treated pulp mill effluent containing harmful contaminants every day from the pulp mill into the Northumberland Strait, on to prime fishing grounds. A fact that was missed in Northern Pulp's original map of the discharge location. The Department of Fisheries and Oceans does not maintain maps of specific fishing locations, only generalized areas. The specific information is

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kept privately by fishers and is ONLY available directly from fishers, any other access to this information is anecdotal.

The Department of Fisheries and Oceans have been shifting their management methods over the years to incorporate a more robust, integrated plan. Ultimately, this means looking at management on a larger, eco-system scale rather than a species-specific or localized scale. This needs to be the case for effluent release as well. A more robust analysis needs to be considered incorporating the bigger picture: physical attributes of the Northumberland Strait, all species fished, their diet, life stages, ideal habitat, bioaccumulation, cumulative impacts and the direct and indirect effects the contaminants will have on all of these. It is not possible to expand on all of these in this short correspondence, but we will focus on some important examples.

The process undertaken by DFO was to identify Ecologically and Biologically Significant Areas (EBSA). This is a valuable tool accepted nationally and internationally for aquatic resource conservation. The Department of Fisheries and Oceans used the EBSA principles: uniqueness, aggregation and fitness consequences to examine the coastal area of the Southern portion of the Gulf of St. Lawrence. The criteria were applied to 32 fish and 23 benthic invertebrate taxa to isolate important areas (IA). Three IAs were recognized in order of priority: Northumberland Strait, St. George's Bay and the eastern end of Prince Edward Island (Figure 1) (Rondeau, A et. Al. 2016).

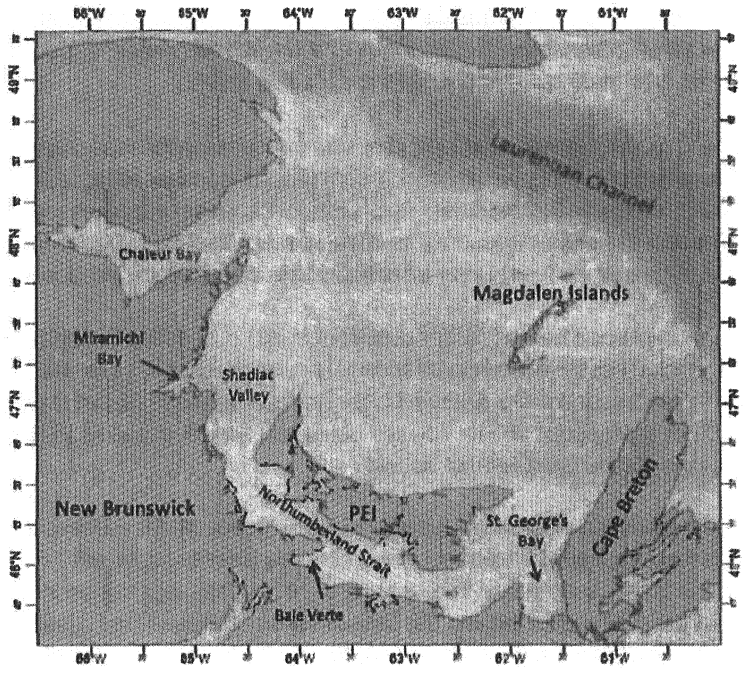


Figure 1: Map of the southern Gulf of St. Lawrence with place names identified. (Prince Edward Island = PEI).

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The mean water flow in the Northumberland Strait is west to east and the residence time is weeks to months but this varies with seasons, storms, etc. (AMEC Earth & Environment 2007). There are also 2 gyres located at each end of the Strait (Fisheries and Oceans Canada 2005) affecting the residence time. These gyres have the capability to retain and redistribute particles, being larvae or toxins (AMEC Earth & Environment 2007). These are important to understand when considering different life stages of a species because it corresponds directly with larval drift and settlement.

To give this some context, we can look at lobster larval transport in the Gulf. Based on the previous description above one can assume that anything entering the Northumberland Strait will drift toward the east, up along the Western side of Cape Breton to the Cabot Strait, and out of the Gulf, but the description leaves out the timeline of this taking place. In 2010 Joël Chassé and Robert J. Miller published "Lobster larval transport in the Southern Gulf of St. Lawrence".

They broke down the Southern gulf to 25 larval source-sink areas (Figure 1) to look at the distribution between the time the eggs are released to the time the larvae settle. When the eggs are released they are reliant on the current for transport and only have the capability to swim to the bottom and seek out suitable habitat at stage 4 (3-12 weeks after release). Pictou (area 21) actually seeds areas 23, 24, 22, 20, 18 and 19 (Figure 2). Seeding in areas 18 and 19 are to a lesser degree but still shows a distribution from east to west, exemplifying the weak current present in the Northumberland Strait. These models were run for the larval and post-larval season, June 1st to September 30th, over a 10-year period. This shows lobster larvae are retained in the Northumberland Strait for up to 120 days while a product of the current and some actually end up west of where they were released rather than east; completely contradicting the description our harvester working group is being given by Northern Pulp and their consultants. This model showed that particular circumstances result in east to west currents lasting days to weeks (Hanson and Comeau 2017).

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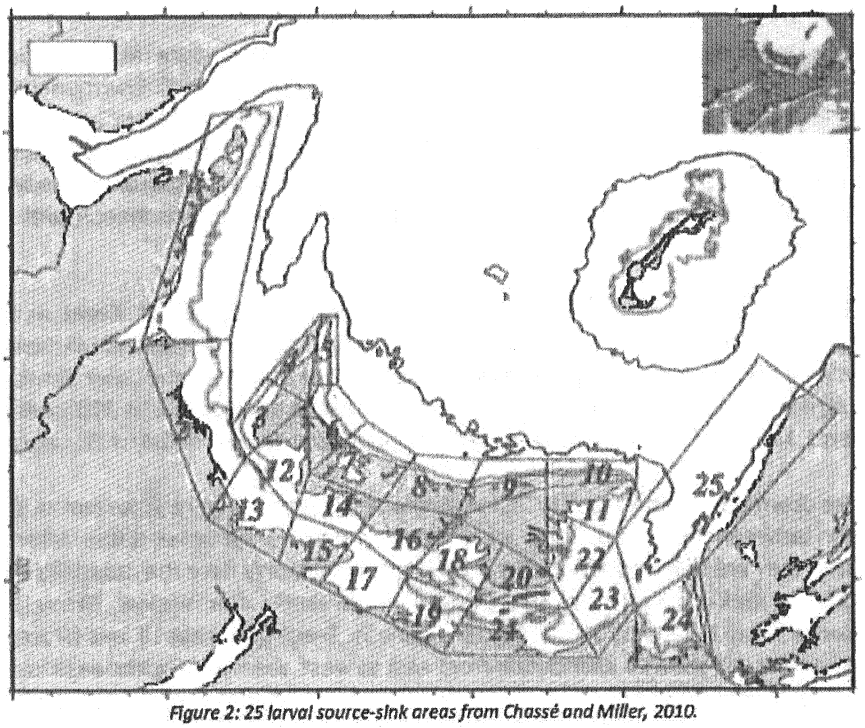


Figure 2: 25 larval source-sink areas from Chassé and Miller, 2010.

Building on this unique characteristic of the Northumberland Strait we can expand the scope of the eco-system from lobster to nutrients and contaminants and their effects on specific species.

There are two major types of bleaching processes, elemental chlorine free (ECF) and total chlorine free bleaching (TCF). In ECF, ClO_2, H_2SO_4, and other chemicals are used in a acidic environment to help enhance the stage of lignin oxidation (Kamali and Khodaparast, 2014). This method can create chlorinated pollutants such as chloroform, dioxins and furans (EPA, 1997). Other contaminants released include heavy metals such as mercury, zinc, cadmium chromium, along with organics, alkylphenols, and oxygen depleting nutrients.

Every report presented by Northern Pulp states: "the location chosen provided the best dilution and mixing and thus the **lowest potential for long-term cumulative effects** on the fishery and socio-economic environments", or, "located sufficiently into the Northumberland Strait to have **minimal impact** on water quality", or "is **not likely to result** in potential adverse effect". These statements are not acceptable to harvesters of the Northumberland Strait.

The Northumberland Strait is less than 20 metres deep over a large central area. Northern Pulp's proposed outfall point was at a depth of only 10 metres. Northern Pulp's proposed effluent release would include increased TSS (985 kg daily) as presented by the Stantec Receiving water

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study and explained via personal communication during the working group meetings with Northern Pulp.

As well, there are multiple risks relating to the presence of ice in the proposed outfall area. Some of these risks are recognized in the Preliminary Receiving Water Study, August 11, 2017 in section 4.2.2, pp 4.80-4.81. Briefly, ice is present in the Northumberland Strait for 4-5 months a year. Both surface and below surface ice is present. The Preliminary RWS notes that "...ice scour is possible and should be anticipated anywhere in Pictou Road and the Northumberland Strait area." The report also cites an example of an MT&T cable which was "severed by ice keel at a water depth greater than 18m towards the Woods Island, PEI side of the Northumberland Strait."

Issues relating to ice include damage to diffusers and the pipe itself, as well as difficulty in timely identification of inaccessibility to repair damage to the pipe during periods when ice is present. Additional issues include how ice presence would affect dispersion of contaminants in the effluent released into the area.

Table 1 shows a brief summary of the work that has been down over the years proving the negative effects of some of these contaminants. The majority of this research focuses on each contaminant independently and it's effect on a specific species. There is very little work done to look at the cumulative effects of the slurry of toxins present in the effluent. Contaminants are often studied for their acute impact on marine life, but their long-term and chronic effects can be very important, especially on growth and reproductive health. Sublethal effects are very important to monitor, as is described by Daoud et al. 2014 and 2016. The emphasis here is that this is only a brief look at research completed. The sub-lethal effects are not listed below because there is too much information to capture in this brief submission.

Table 1: Brief summary of work completed identifying contaminants and their negative effects on specific species in the Northumberland Strait

Contaminant	Name	Species	Stage	Effects	Ref
Alkylphenol	4-di-methylbenzylphenol (Comp 1, 2, 3, 4)	*H. americanus*	Adults	Hemolymph Hepatopancreas presence	William and Laufer 2004, Jacobs et al, 2012
Alkylphenol	BPA, Comp 3	*H. americanus*	Larvae-stage II to IV	Survival drops moult delayed	Laufer, H., Baclaski, B. and Koehn, U. 2012
Alkylphenol	BPA, Comp 3	*H. americanus*	Adult	Shell hardening affected	Laufer, H., Chen, M., Johnson, M., Demir, N. and Bobbitt, J.M. 2012

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	PNP	*H. americanus*	Larvae-Stage I	96-h LC50 = 71 µg/L	Lussier et al. 2000
		Pleuronectes americanus	Larvae	96-h LC50 = 17 µg/L	Lussier et al. 2000
		Mulinia lateralis	embryo-larvae	96-h LC50 = 37.9 µg/L	Lussier et al. 2000
Bleached craft meal effluent-chlorinated compounds		*H. americanus*	Adult Larvae	Mortality (only)-resistant at natural levels	Carlisle et al. 2009
Endocrine disruption compounds	Nonylphenol, estrogen, metals etc...	*Fish*		A VAST SUBJECT	Van den Heuvel, 2010
Combination of Chlorine and temperature increase		*H. americanus*		Higher toxicity when increase in temperature	Capuzzo, et al. 1976
Sublethal levels		*Lots on multiple fish species*		IMPORTANT SUBJECT	

BPA or Comp 6: bisphenol A; Comp 3 : 2,4-bis-(dimethylbenzyl) phenol; Comp 1: 2-t-butyl-4-(dimethylbenzyl)phenol; Comp 2: 2,6-bis-(t-29-butyl)-4-(dimethylbenzyl)phenol (MON-0585 a Monsanto mosquito larvicide); Comp 3: 2,4-bis-(dimethy;-benzyl) phenol; Comp 4: 2,4-bis (t-butyl)-4-(dimethylbenzyl)-6-butylphenol; Comp 5: 4-cumylphenol.

As mentioned above the cumulative effects of these contaminants have not been the focus of research. The request of this harvester working group is to have an in-depth look at cumulative effects completed. It has been pointed out to this harvester group that there are paper mills in British Columbia discharging into coast waters. When looking at what is happening surrounding those plants we found large bivalve closures due to the presence of biotoxins (Figure 3). This group is not putting the blame solely on those pulp and paper mills present in BC, but they feed into the cause of these closures. The harvesters of Nova Scotia, Prince Edward Island and New Brunswick cannot afford to see these kinds of complete closures in the Northumberland Strait and surrounding areas.

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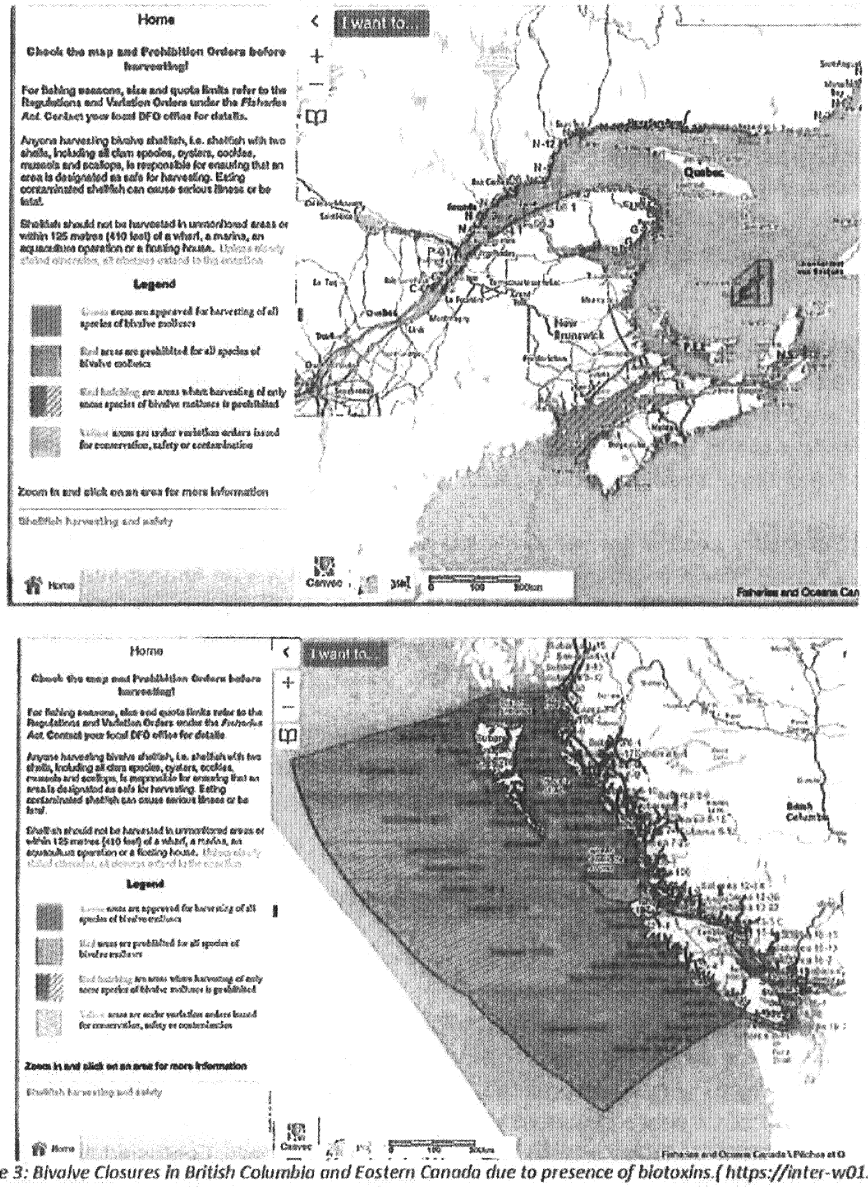


Figure 3: Bivalve Closures in British Columbia and Eastern Canada due to presence of biotoxins.(https://inter-w01.dfo-mpo.gc.ca/Geocortex/Essentials/Viewer/Index.html?viewer=CSSP_Public_En_Site)

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The Northumberland Strait is home to numerous important and declining species. For instance, the central portion of the Strait acts as a major nursery for juvenile Atlantic Herring (Hanson and Comeau 2017). There are also very few herring spawning beds left in the Southern Gulf and one of those beds is located not far from the mouth of Pictou Harbour (Surette et al. 2016).

The Winter Skate and lady crab populations "almost certainly represent undescribed endemics" (endemism is the ecological state of a species being unique to a defined geographic location). Unfortunately, without crucial intervention to decrease adult mortality, Winter Skate has a high likelihood of becoming extinct before description of the species can be completed. (Hanson and Comeau 2017).

White hake are also reported in St. George's Bay and the eastern end of the Northumberland Strait and this is also the only remaining spawning area and critical summer feeding area for them. Given the endangered status of this white hake population, according to COSEWIC 2013, concentrations of this species, specifically the adolescents in the three IAs, intensify the significance of these areas (Rondeau et. Al. 2016).

Atlantic Sturgeon is another species rare in the Northumberland Strait and was listed as threatened by COSEWIC in 2011. In early October 2018 there was an Atlantic Sturgeon caught in a herring net off Caribou, NS. This was explained through personal communication along with pictures. The Sturgeon was previously tagged and was released healthy from that boat. This adds to the species of importance directly in the area.

In conclusion, this letter is a brief review of factual information we have identified. It is far from exhaustive based on the work completed surrounding the Southern Gulf of St. Lawrence and more specifically the Northumberland Strait. The information is widespread, focusing on but not limited to:

- the uniqueness of the area,
- ecologically and biologically significant zones,
- current nutrient loading
- current anoxic areas,
- species of interest in the area
- the delicacy of ocean acidification in the Northumberland Strait
- warming waters in the Gulf of St. Lawrence and the Northumberland Strait
- the changing eco-system in the Gulf from 2016-current

There are numerous reviews completed stating that more work is needed to better understand things like the nutrient loading and the corresponding anoxic zones. Continued effort needs to be made to better monitor ocean acidification as well as the changes in the ocean eco-system.

Although we are requesting that a Federal Environmental Assessment be conducted there is a lack of concrete scientific evidence proving the effluent is safe. Based on the importance of this ecological area to our collective fisheries, the proposed project cannot proceed.

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Smith, Colleen A

From: Smith, Colleen A
Sent: October-23-18 3:32 PM
To: Yeh, Helen X
Cc: Wambolt, Michael; Jalloh, Rugi
Subject: RE: NP's proposed geotechnical work at Caribou Harbour

Hi Helen,

Thank you for the opportunity to review this activity. In general DFO considers this activity to be low risk, however, DFO recommends that all contractors and crew conducting the proposed activity follow the standard measures in relation to marine mammals that are described in the Canadian Coast Guard's Notices to Mariners. In particular, the NOTMAR 5 General Guidelines for Aquatic Species at Risk and Important Marine Mammal Areas includes general guidelines for operating in the vicinity of marine mammals.

Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
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Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Yeh, Helen X [mailto:Helen.Yeh@novascotia.ca]
Sent: October-23-18 9:09 AM
To: Hominick, Craig
Cc: Wambolt, Michael; Smith, Colleen A
Subject: FW: NP's proposed geotechnical work at Caribou Harbour

Hi Craig,

I have sent Rugi this request below for comments (see below and attached), Please let me know **if you have comments today if possible.**

Essentially, I would like to know if you folks have any comments NP commences the geotechnical work to collect the baseline information for the new effluent pipeline route. If easier, I can give one of you a quick call. Thanks.

Helen

From: Yeh, Helen X
Sent: Tuesday, October 23, 2018 8:57 AM
To: 'Jalloh, Rugi' <Rugi.Jalloh@dfo-mpo.gc.ca>
Subject: FW: NP's proposed geotechnical work at Caribou Harbour

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Hi Rugi, I am just following up on this, and was wondering if you can let me know whether you folks have comments today. If easier, I can give you a call. Thanks. Helen.

From: Yeh, Helen X
Sent: Thursday, October 18, 2018 3:05 PM
To: 'Jalloh, Rugi' <Rugi.Jalloh@dfo-mpo.gc.ca>; Theriault, Marc P <Marc.Theriault@novascotia.ca>
Cc: Bowen, Lynn A <Lynn.Bowen@novascotia.ca>
Subject: NP's proposed geotechnical work at Caribou Harbour

Hi Rugi and Marc,

Northern Pulp plans to conduct geotechnical work to collect further baseline information regarding the new effluent pipeline route (at Caribou Harbour) likely next week I believe.

Rugi, I understand from NP that they have briefed you folks at DFO about the new route. If you have any further questions, please let me know.

Please let me know if you have any comments by tomorrow (if possible). Thanks.

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: Tuesday, October 16, 2018 1:51 PM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Wilson, Michael <michael.wilson@northernpulp.com>; Breen, Don [redacted] Davis, Dave [redacted] MacDougall, Hugh [redacted]
Subject: RE: NPNS - CSR/Stantec Harbour Bottom Survey Plan

Hi Helen,

Please also find attached the CSR scope of work.

Regards,

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Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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www.paperexcellence.com

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---

From: Fraser, Terri
Sent: Tuesday, October 16, 2018 1:38 PM
To: 'Helen.Yeh@novascotia.ca' <Helen.Yeh@novascotia.ca>
Cc: Wilson, Michael <michael.wilson@northernpulp.com>; [redacted] MacDougall, Hugh [redacted]
Subject: NPNS - CSR/Stantec Harbour Bottom Survey Plan

Hi Helen,

I have attached the revised Stantec survey plan for your review. It is an update of the original plan shared with you back in April 2018. We have CSR going back in the water next week to begin performing the additional survey work.

Best Regards,

Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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www.paperexcellence.com

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s.19(1)

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Smith, Colleen A

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: October-23-18 4:27 PM
To: Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael
Subject: NPNS Marine Survey Work - Update for week of October 22

Hi,

CSR GeoSystems attempted to start their in-water survey work today but were met with significant resistance by fishermen. The RCMP opened an investigation today after responding to diffuse the situation. CSR is concerned for the safety of their people and their boat. At this point it is doubtful we will be back in the water this week.

Regards,

Terri Fraser P. Eng.
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461

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www.paperexcellence.com

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Smith, Colleen A

From: Troy Young <Troy.Young@pwgsc-tpsgc.gc.ca>
Sent: October-24-18 11:53 AM
To: Smith, Colleen A
Subject: RE: Request for information to be released
Attachments: 2014_2015_TV141220_MSSP_CaribouFerry_FinalRpt_27Feb2015_AMECFW.pdf
Attachment provided elsewhere on the file.

Please find attached the MSSP.

Let me know if there is anything else you need.

ty

Troy Young, B.Sc.
Acting/Manager Environmental Evaluations, Atlantic
Tel: (902) 802-4327 / Fax/Téléc: (902) 496-3320
troy.young@pwgsc.gc.ca / troy.young@tpsgc.gc.ca
1713 Bedford Row, PO Box 2247, Halifax, N.S. B3J 3C9
1713 Bedford Row, C.P. 2247, Halifax, N.E. B3J 3C9
Public Services and Procurement Canada /
Services Publics et de l'Approvisionnement Canada

From: Smith, Colleen A [mailto:Colleen.Smith@dfo-mpo.gc.ca]
Sent: October-24-18 9:42 AM
To: Troy Young <Troy.Young@pwgsc-tpsgc.gc.ca>
Subject: RE: Request for information to be released

Hi Troy,

The new proposed route for the Northern Pulp Effluent Facility proposes to go from Pictou, follow along the Highway to the Caribou Ferry, then take the pipeline north and loop to the right about 4 km from shore around the Ferry route. This is an area that harvesters are unlikely to heavily fish so it reduces the risk of interaction.

The proponent is having issues trying to gather information in the field so they are looking for any existing information that could give them an idea of what the habitat is and what the surficial and sub surficial geology looks like so they have a better understanding of how they will be able to construct the pipe and to inform their EA.

Colleen

From: Troy Young [mailto:Troy.Young@pwgsc-tpsgc.gc.ca]
Sent: October-24-18 9:35 AM
To: Smith, Colleen A
Subject: Re: Request for information to be released

Do you know why they are looking for them?

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Troy Young
PWGSC-ES
802-4327

From: Smith, Colleen A
Sent: Wednesday, October 24, 2018 9:31 AM
To: Troy Young
Subject: RE: Request for information to be released

Perfect, thank you Troy! I will send the two documents I have and await the other one. When you send it to me I will provide it to Stantec.

Thanks,

Colleen

From: Troy Young [mailto:Troy.Young@pwgsc-tpsgc.gc.ca]
Sent: October-24-18 9:30 AM
To: Smith, Colleen A
Subject: Re: Request for information to be released

Yes they are ok to release, I also checked with Transport Canada, since they are their documents, and they too are ok to release.

Troy Young
PWGSC-ES
802-4327

From: Smith, Colleen A
Sent: Wednesday, October 24, 2018 9:24 AM
To: Troy Young
Subject: RE: Request for information to be released

Hi Troy,

I just need the Marine Sediment Sampling Report and I need to know if it is ok to release the documents to the public.

Thank you,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

From: Troy Young [mailto:Troy.Young@pwgsc-tpsgc.gc.ca]
Sent: October-24-18 9:15 AM
To: Smith, Colleen A
Subject: Re: Request for information to be released

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Apologies on the delay on getting reports to you, I am at a conference yesterday and today, I will try to get chance to send later today.

Troy Young
PWGSC-ES
802-4327

From: Smith, Colleen A
Sent: Monday, October 22, 2018 10:35 AM
To: Troy Young
Subject: RE: Request for information to be released

Hi Troy,

These are the two we have on file. Do you have the other one?

Colleen

From: Troy Young [mailto:Troy.Young@pwgsc-tpsgc.gc.ca]
Sent: October-22-18 10:09 AM
To: Smith, Colleen A
Subject: Re: Request for information to be released

Actually, these reports shou ld have all been provided to FPP as part of the initial project

Troy Young
PWGSC-ES
802-4327

From: Smith, Colleen A
Sent: Monday, October 22, 2018 9:54 AM
To: [redacted]
Cc: Troy Young
Subject: Request for information to be released

Hi Chyann,

I called and left a message on your voicemail earlier this morning. The Fisheries Protection Program has received a request to release the following documents:

AMEC. 2014. Ocean Dredging Disposal Site Stability and Dispersion, Caribou Ferry Terminal, NS. Report prepared for: Public Works and Government Services Canada, Halifax, NS.

AMEC. 2015. Fisheries Habitat Survey at the Disposal at Sea Site near the Transport Canada Ferry Terminal in Caribou, Nova Scotia.

AMECFW. 2015. Marine Sediment Sampling Program, Transport Canada Ferry Terminal in Caribou, Pictou County, Nova Scotia

FPP does not have the marine sediment sampling program report on our files but perhaps Troy or you have a copy that you could provide. Do the reports contain any proprietary or intellectual property?

Colleen

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Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

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Smith, Colleen A

From: Salley, Sam <Sam.Salley@stantec.com>
Sent: October-24-18 5:30 PM
To: Smith, Colleen A
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com); Jalloh, Rugi
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hi Colleen,

These are very good studies to have and for background reference to areas nearby.

Thank you again for obtaining them.

Sam

Sam Salley, M.Sc.
Principal, Senior Marine Scientist

Direct:
Mobile:
Fax: 902-468-9009

Stantec Consulting Ltd.
102-40 Highfield Park Drive
Dartmouth NS B3A 0A3 CA

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---

From: Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Sent: Wednesday, October 24, 2018 11:59 AM
To: Salley, Sam <Sam.Salley@stantec.com>
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com) <terri.fraser@northernpulp.com>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hello Sam,

Please find attached the requested documents.

Regards,

Colleen

Colleen Smith, BSc.
Senior Fisheries Protection Biologist, Fisheries Protection Program
Ecosystem Management, Fisheries and Oceans Canada
PO Box 1006, 5th Floor Polaris, P500
Dartmouth, NS B2Y 4T3
Tel. 902-293-7834
Colleen.smith@dfo-mpo.gc.ca

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From: Salley, Sam [mailto:Sam.Salley@stantec.com]
Sent: October-18-18 4:39 PM
To: Jalloh, Rugi
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com); Smith, Colleen A
Subject: RE: Northern Pulp NS - Caribou dredging - Impact Analysis

Hi Rugi,

Thank you for the providing the PWGSC (2015) CEPA assessment, which contains very useful summary information.

Would there be a chance we can get a copy of the following reports cited and which would likely have more detail and be quite relevant?

AMEC. 2014. Ocean Dredging Disposal Site Stability and Dispersion, Caribou Ferry Terminal, NS. Report prepared for: Public Works and Government Services Canada, Halifax, NS.

AMEC. 2015. Fisheries Habitat Survey at the Disposal at Sea Site near the Transport Canada Ferry Terminal in Caribou, Nova Scotia.

AMECFW. 2015. Marine Sediment Sampling Program, Transport Canada Ferry Terminal in Caribou, Pictou County, Nova Scotia

Transport Canada. Atlantic Region 2008. Environmental Assessment Screening Report - Channel Re-Dredging and Land-based Disposal, Caribou Ferry Terminal, NS

Thank you again for your assistance.

Kind regards,

Sam

Sam Salley, M.Sc.
Principal, Senior Marine Scientist

Direct:
Mobile:
Fax: 902-468-9009

Stantec Consulting Ltd.
102-40 Highfield Park Drive
Dartmouth NS B3A 0A3 CA

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From: Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>
Sent: Thursday, October 18, 2018 2:39 PM
To: Salley, Sam <Sam.Salley@stantec.com>
Cc: Fraser, Terri (terri.fraser@northernpulp.com) (terri.fraser@northernpulp.com) <terri.fraser@northernpulp.com>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: Northern Pulp NS - Caribou dredging - Impact Analysis

Hello Sam,

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Please find attached report, hope you find it useful. Let me know if you need any other information. Also, feel free to contact our colleagues in the Gulf Region.
Thanks,

Ms. Rugi Jalloh, Fisheries Protection Biologist
Ecosystem Management/Gestions des écosytèmes
Fisheries and Oceans Canada/Pêches et Océons Canada
Tel/ tél: 902-401-0897
Fax/ téléc: 902-426-1489
1 Challenger Dr./1 promenade Challenger
P.O. Box/C.P. 1006, Station P410
Dartmouth, NS/NE B2Y 4A2

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PWGSC PROJECT #R.071769.004
FISHERIES HABITAT SURVEY
Proposed Disposal at Sea Site
Caribou, Nova Scotia

FINAL REPORT

Submitted to:
Public Works and Government Services Canada
Halifax, Nova Scotia

Submitted by:
AMEC Environment & Infrastructure,
a division of AMEC Americas Limited
Dartmouth, Nova Scotia

March 2015

TV141220

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3 March 2015

Mr. Troy Young, B.Sc.
Environmental Specialist
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Dear Mr. Young

Re: Fisheries Habitat Survey at the Disposal at Sea Site near the Transport Canada Ferry Terminal in Caribou, Nova Scotia – Final Report

AMEC Environment & Infrastructure, a division of AMEC Americas Limited, is pleased to provide Public Works and Government Services Canada the findings of a Fisheries Habitat Survey undertaken within the bounds of a proposed Disposal at Sea site near the Transport Canada Ferry Terminal in Caribou, Nova Scotia.

AMEC appreciates the opportunity to provide services to your organization. Please do not hesitate to call if you have any questions regarding this, or any other matter.

Respectfully submitted,

Senior Environmental Scientist
Direct Tel.:
Direct Fax:
E-mail:

AMEC Environment & Infrastructure
A division of AMEC Americas Limited
50 Troop Avenue, Unit 300
Dartmouth, Nova Scotia
B3B 1Z1
Tel +1 (902) 468-2848
Fax +1 (902) 468-1314

www amec com

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Appendix B Annotated Species List
Appendix C Limitations

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1.0 INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), a Fisheries Habitat Survey (FHS) was completed on 16 December 2014 within the bounds of a proposed Disposal at Sea (DAS) site in the Northumberland Strait near the Transport Canada (TC) Ferry Terminal in Caribou, Nova Scotia (Figure 1.1).

2.0 SCOPE AND METHODOLOGY

Qualitative and quantitative observations were obtained from the footprint of the proposed DAS using video survey techniques to map substrate types and document macrofaunal and macrofloral species presence and abundance. AMEC contracted Connors Diving Services to perform the diving and video surveillance services. An AMEC representative was on-site to guide the dive crew in the event that any issues arose and to obtain supporting habitat and biological information.

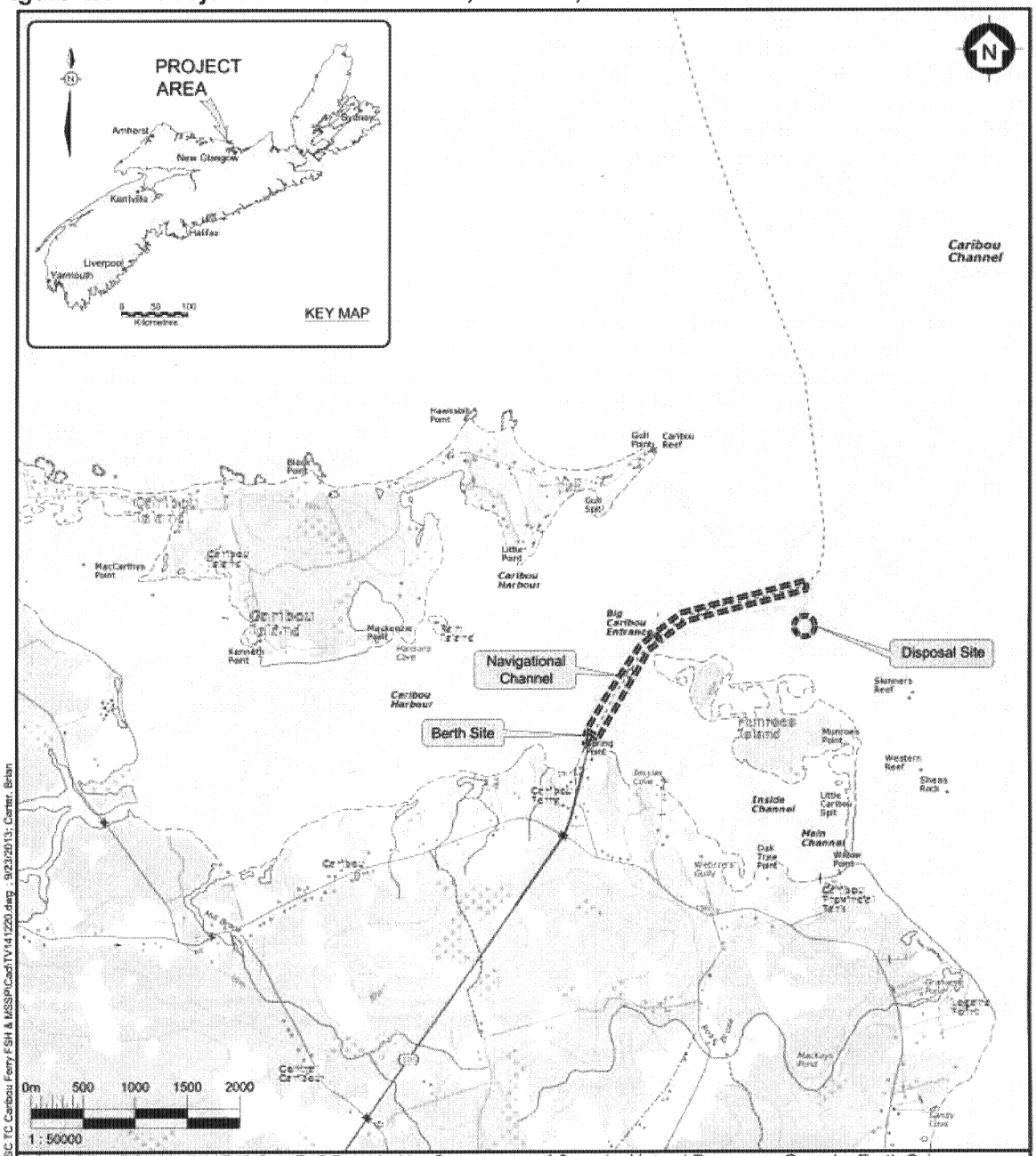
A total of 800 metres (m) of video surveillance was divided into two transects (T1 and T2) and two tie-lines (TT1 and TT2), each measuring 200 metres (m), at a historical (1981) DAS site within the Northumberland Strait near Caribou, NS (Figure 2.1). The location of the DAS site was selected by PWGSC following dispersion modelling conducted by AMEC in March 2014 and following consultation with AMEC as to the likelihood that recent site survey data will not significantly change the predicted outcome of that modelling (November 2014).

The transect locations were visually referenced in the field and coordinates were derived using a handheld Global Positioning System (GPS) to mark the start and end points of the transects. These coordinates are also provided in Figure 2.1.

An additional five drop-surveys were conducted outside of the transects and tie lines to spot-check for the presence of eelgrass (*Zostera marina*) beds (Figure 2.1). The underwater surveillance of the transects required the use of an underwater video camera, operated by a Canadian Standards Association (CSA)-certified diver using SCUBA. As much as was practical, the underwater video surveillance encompassed a span of approximately 1m on either side of the transect line. Seabed characterization involved field observations made by the field crew and a review of the video surveillance tape. Observations along the video transect were made for every 5m segment.

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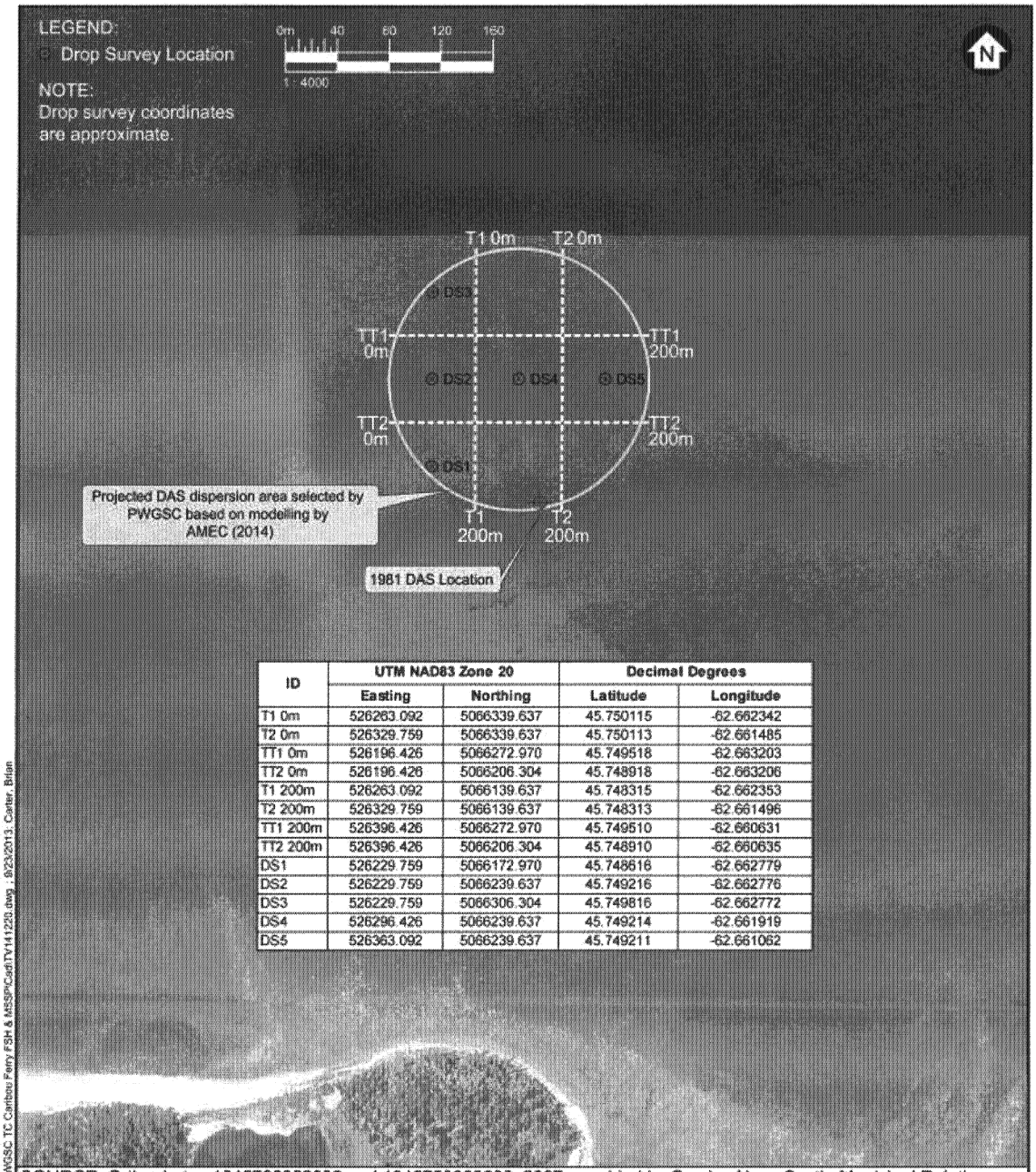
Figure 1.1 Project Site Location Plan, Caribou, NS



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Figure 2.1 Underwater Video Transect and Transect Tie-Line Locations within the Proposed Disposal At Sea Site, Caribou, NS (16 December, 2014)



ID	UTM NAD83 Zone 20		Decimal Degrees	
	Easting	Northing	Latitude	Longitude
T1 0m	526263.092	5066339.637	45.750115	-62.662342
T2 0m	526329.759	5066339.637	45.750113	-62.661485
TT1 0m	526196.426	5066272.970	45.749518	-62.663203
TT2 0m	526196.426	5066206.304	45.748918	-62.663206
T1 200m	526263.092	5066139.637	45.748315	-62.662353
T2 200m	526329.759	5066139.637	45.748313	-62.661496
TT1 200m	526396.426	5066272.970	45.749510	-62.660631
TT2 200m	526396.426	5066206.304	45.748910	-62.660635
DS1	526229.759	5066172.970	45.748616	-62.662779
DS2	526229.759	5066239.637	45.749216	-62.662776
DS3	526229.759	5066306.304	45.749816	-62.662772
DS4	526296.426	5066239.637	45.749214	-62.661919
DS5	526363.092	5066239.637	45.749211	-62.661062

SOURCE: Orthophotos 1045700062600 and 1045750062600, 2007; provided by Service Nova Scotia Municipal Relations.

TITLE: Site Plan Fisheries Habitat Survey Location Caribou Ferry, Caribou, Nova Scotia	DATE: January 2015	PROJECT NO: TE141220	amec
	DWN BY: DS / BC	PROJECTION: UTM Zone 20	
	CHK'D BY: CK	DATUM: NAD83	
CLIENT: Public Works and Government Services Canada	REV. NO.: N/A	SCALE: 1:4000	

P:\5300 PROJECTS\2014\TV141220 PWGSC TC Caribou Ferry FSH & MSS\PCad\TV141220.dwg ; 8/23/2013, Carter, Brian

001004

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3.0 FISHERIES HABITAT SURVEY RESULTS

The results of the transect surveys for the proposed project footprint are presented in Attachment A (Tables A.1 to A.4), including the following information for each 5m increment of transect line:

- visual determination of substrate type (in order of dominance);
- macrofaunal species identification and abundance; and
- macrofloral species identification and percent coverage.

A summary of the information provided in Tables A.1 to A.4 (Attachment A) is described in the following paragraphs. An annotated species list has been included in Attachment B.

For the purposes of the video survey review and macrofaunal species identification and enumeration, four categories were developed to characterize the observed abundances. The categories are as follows:

A = Abundant
Numerous (not quantifiable) observations made throughout the entire 5m segment.
C = Common
Numerous (not quantifiable) observations made intermittently along the 5m segment.
O = Occasional
Quantifiable observations made intermittently along the 5m segment.
U = Uncommon
Quantifiable observations made infrequently along the 5m segment.

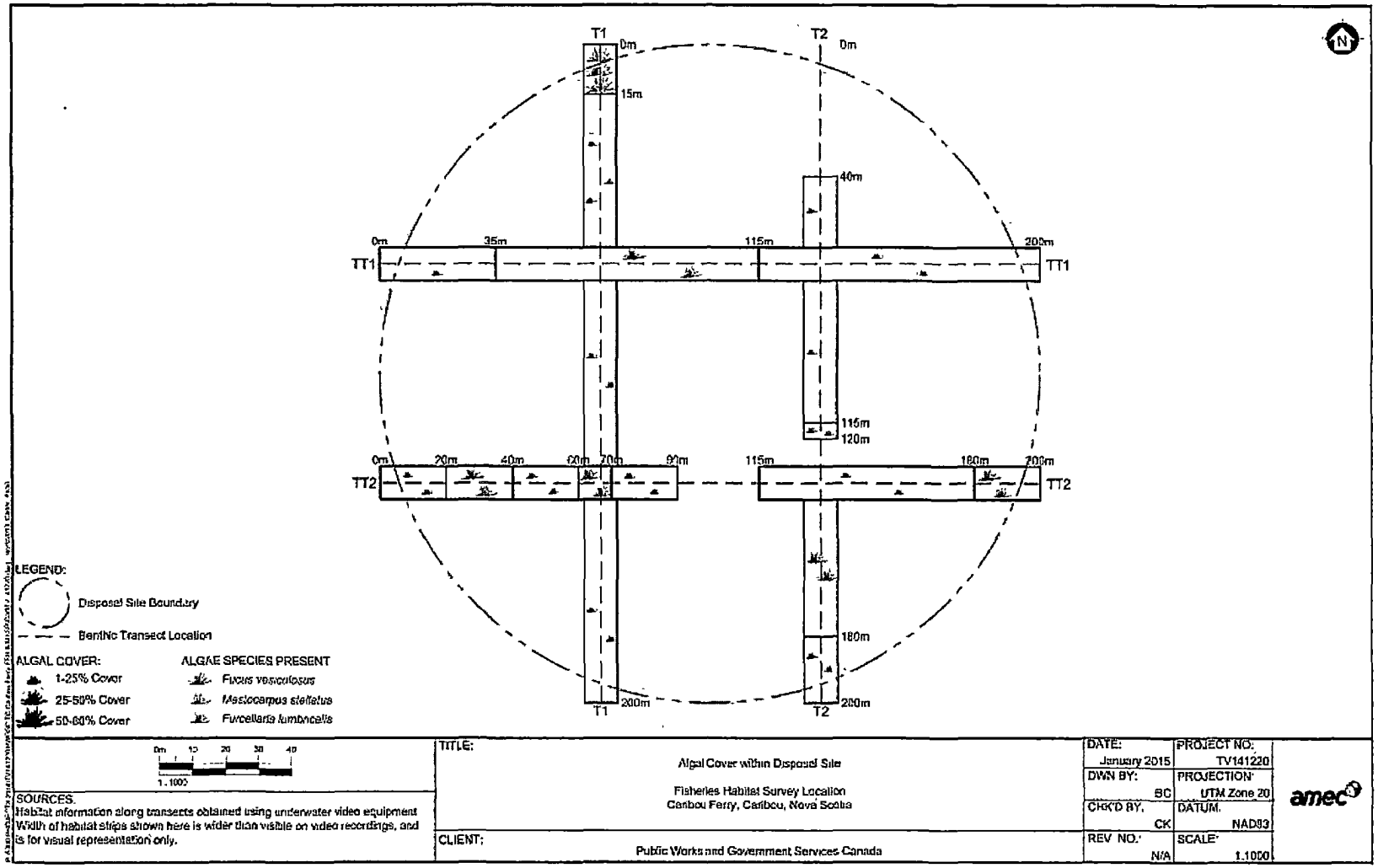
Observations of macrofaunal life were noted along all transects (T1 to T4), as further described in this section and depicted, to the extent possible, in Figures 3.1 and 3.2.

It is important to note that shell hache (i.e., broken and fragmented shells that do not support macrofaunal life) was noted along segments of all four transects. For the purposes of this report, shell hache has not been considered as macrofaunal life, therefore observations are reported as a note beneath the transect descriptions below and associated tables in Attachment A (where encountered).

Macrofloral debris (i.e., detritus macrofloral species) was also noted along segments of all four transects. For the purposes of this report, debris of this nature has not been considered as macrofloral life, therefore observations are reported as a note beneath each of the transect descriptions below and associated tables in Attachment A (where encountered).

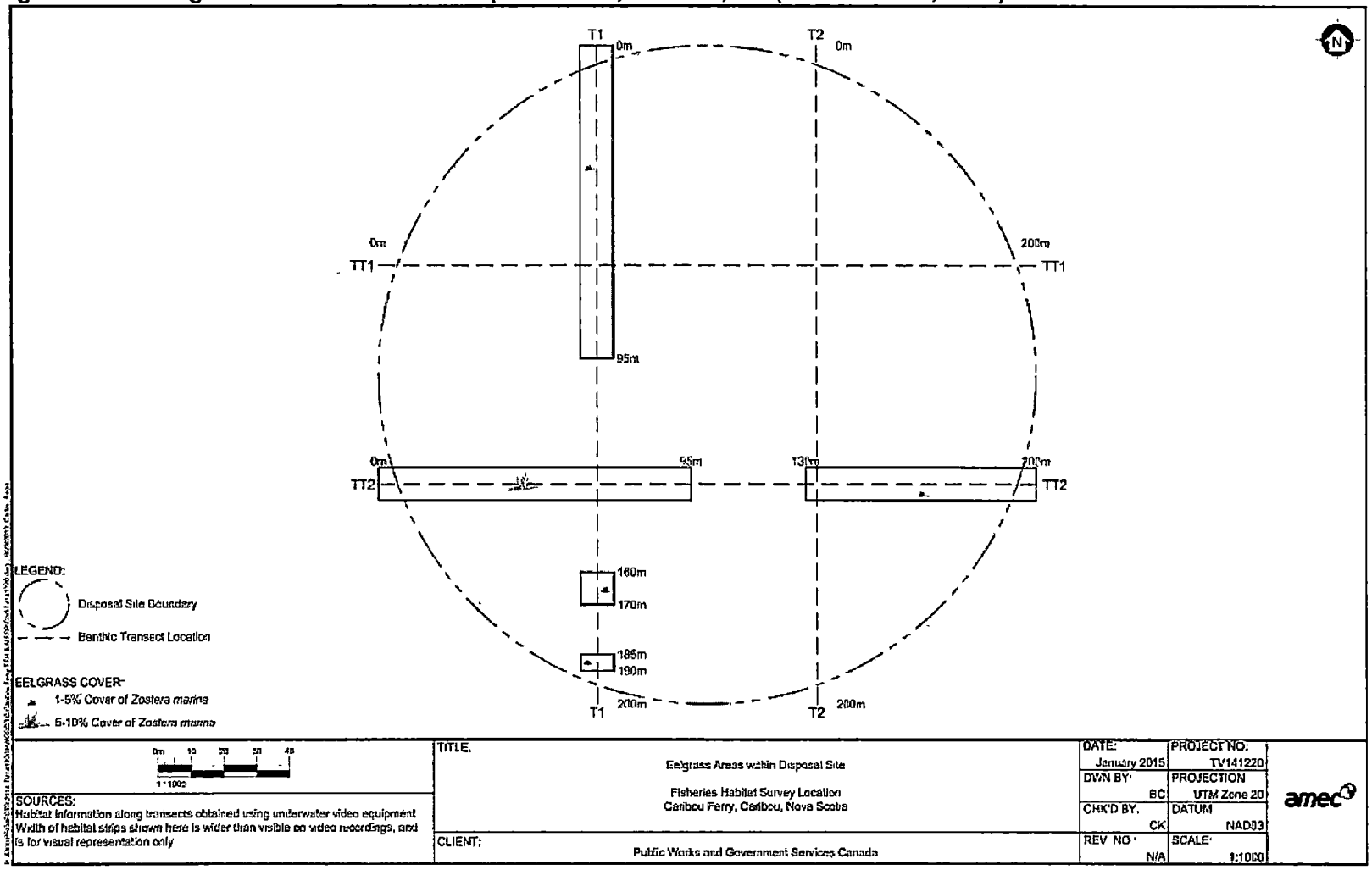
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Figure 3.1 Algal Cover within the Proposed DAS, Caribou, NS (16 December, 2014)



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Figure 3.2 Eelgrass Cover within the Proposed DAS, Caribou, NS (16 December, 2014)



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Eelgrass observations were a specific element of the program scope due to it's niche in the marine environment. Eelgrass has an important physical role in the marine environment by stabilizing sediments and supporting a variety of important biological functions including providing a surface for the colonization by other plants and animals and shelter for various fish species (Mann, 1982).

In general, visibility along each transect was mediocre to good. At all times the visibility allowed for a clear characterization of the level of vegetative cover that could serve as fish habitat. The presence of small cobble caused problems with the identification of periwinkles. Unless the periwinkles were oriented in a specific position it was difficult to discern between the invertebrates and pebbles.

3.1 Transect 1 (T1)

Transect 1 (T1) was filmed in a north-south orientation, spanning the proposed DAS site for a total of 200m (Figure 3.1).

Substrate:
The substrate along this transect was predominantly composed of sand (60-95%) with areas of cobble (5-25%) noted to approximately the midpoint of the transect. Rock was noted in low percentages intermittently along the transect (5-10%). Silt was observed along the entire length of the transect (5-10%).

Macrofauna:
Twelve species were observed along T1, the most frequently noted being Stimpson's whelk (*Colus stimpsoni*) and periwinkles (*Littorina* sp.) but only with occasional observances. Other species noted occasionally included sand dollar (*Echinarachnius parma*); Northern moon snail (*Euspira heros*), and scallop (*Placopecten magellanicus*). Uncommon occurrences of seven species were noted intermittently along the transect which included rock crab (*Cancer irroratus*), unidentified fish species, hermit crab (*Pagarus acadianus*), bread crumb sponge (*Halichondria panacea*), soft shell clam (*Mya arenaria*), Amercian lobster (*Homarus americanus*), and eyed finger sponge (*Haliclona oculata*). In general, the abundance of species were higher in the first half of the transect where more hard bottom and algal cover was present. Shell hache was present in much of the transect.

Macroflora:
Macrofloral life, consisting of four different species, was observed along the entire length of the transect. The highest density of macrofloral coverage, ranging between 35 and 70%, was noted in the first third of the transect. This is consistent with the presence of a higher percentage of hard bottom as noted above. Macrofloral cover for the remainder of the transect ranged between 5 and 30% but generally was under 10%. Bladderwrack (*Fucus vesiculosus*) and false Irish moss (*Mastocarpus stellatus*) were the predominant species along the length of the transect. A red alga (*Furcellaria lumbricalis)* was observed only in the first 70m of the transect. Eelgrass was noted in approximately 30% of the transect segments with sparse cover that did

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not exceed 5%. Macrofloral debris was observed in approximately 75% of the transect segments but again, was sparse in its coverage.

3.2 Transect 2 (T2)

Transect 2 (T2) was filmed in a north-south orientation, spanning the proposed DAS site for a total of 200m (Figure 1).

Substrate:
The substrate along this transect was predominantly composed of sand (60-95%) with areas of cobble (5-30%) noted from the 45m mark to the end of the transect. Rock was observed intermittently along T2, though never comprising more 5% of the total substrate composition. Silt was observed along the entire length of the transect (5%).

Macrofauna:
Macrofaunal life, consisting of two species, was observed along the entire length of T2. Nine species were observed with the most frequently noted being Stimpson's whelk with a frequency that ranged between occasional and common. Scallops, rock crabs and sand dollars were noted occasionally along T2. Uncommon occurrences of periwinkles, northern moon snail, bread crumb sponge, soft shell clam and unidentified fish species were noted. Shell hache was observed along most of the transect.

Macroflora:
Macrofloral life was observed along 80% of T2. False Irish moss and bladderwrack were most common, ranging in coverage from approximately 5%-40%. The highest amount of cover was observed between metres 115 and 180, which is consistent with the highest cover of rock and cobble. Macrofloral debris was noted throughout the transect but did not have a coverage higher than 5%.

3.3 Transect Tie-Line 1 (TT1)

Transect Tie-Line 1 (TT1) was filmed in a west-east orientation, spanning the proposed DAS site for a total of 200m (Figure 3.1).

Substrate:
The substrate along this transect was predominantly composed of sand (85-95%). Cobble was noted throughout the transect but comprised only 5-10% of the overall composition. Silt was observed along the entire length of the transect (5%).

Macrofauna:
Macrofaunal life was noted along the majority of TT1. Eight species were observed, the most frequentl noted being Stimpson's whelk, with a frequency that ranged between occasional and common. Scallop, sand dollar, rock crab, and bread crumb sponge were noted with occasional frequency. Northern moon snails, unidentified fish species, and sea stars (*Asterias* sp.) were uncommonly observed. Shell hache was observed in most of the transect.

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Macrofloral:
Macrofloral life, consisting of two species, was occasionally observed along almost the length of TT1, with coverage never exceeding 20% for bladderwrack and 15% for false Irish moss. Macrofloral debris (5% cover) was observed along the entire transect.

3.4 Transect Tie-Line 2 (TT2)

Transect Tie-Line 2 (TT2) was filmed in a west-east orientation, spanning the proposed DAS site for a total of 200m (Figure 1).

Substrate:
The substrate along this transect was predominantly composed of sand (55-95%). The percentage of sand was greater than 80% in all segments except for the final three. Cobble was a minimal (5-10%) proportion of the substrate except for the last three segments where it comprised 40% of the overall composition. Silt was observed along the entire length of the transect (5%).

Macrofauna:
Macrofaunal life was noted along 75% of TT2. Six species were observed along the transect, the most frequently noted being Stimpson's whelk (occasional to common frequency) followed by sand dollar (occasional frequency). Uncommon frequencies of bread crumb sponge, scallop, Northern moon snail, and rock crab were also noted. Shell hache was observed through most of the transect.

Macroflora:
Macrofloral life, consisting of bladderwrack and false Irish moss, was observed along 85% of TT2, with coverage ranging between 5 and 35%. Eelgrass was observed along two thirds of TT2 with coverage ranging between 5 and 10%. Macrofloral debris (5% cover) was observed in 50% of the segments of the transect.

3.5 Additional Drop-Survey Areas

Five additional areas outside the boundaries of the transect and tie lines were spot-checked for the presence of eelgrass (*Zostera marina*) beds. These areas were selected in voids not covered by the transects. The diver collected video of an approximate 10 x 10 m area at each of the five sites. The five videos were consistent with what was observed in the transect videos noting patchy composition of bladderwrack and false Irish moss. Eelgrass was absent from the spot check areas with the exception of an occasional strand. The substrate in the five areas was predominantly sand with variable amounts of cobble and some rock.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The diving crew was directed by an on-site AMEC representative [redacted] experienced in data collection for environmental assessment project components. [redacted] was responsible for the data collection and overall data quality as well as for ensuring that all standard operating procedures were followed and that adequate health and safety measures were taken.

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A Project Reviewer (Ms. Kerry Higgins, B.Sc., EP) has reviewed this report prior to its release. The limitations of this document are provided in Attachment C.

5.0 SUMMARY

Characterizations of the substrate and benthic communities along the transects within the proposed DAS site in Caribou Harbour were completed using a combination of visual field observations and underwater video survey techniques.

The dominant substrate type in the footprint of the proposed DAS site was sand with varying amounts of cobble and rock. Cobble comprised 5-20% of the substrate but in rare instances the percentage of cobble was over 30%. Rock was observed in few instances with a generally low percentage of the overall composition. Silt was observed throughout the all the transects but with minimal contribution to the overall composition (5-10%).

Macrofaunal life was observed in all four transects within the proposed DAS site. The species noted in the most 5 m sections included Stimpson's whelk (occasional to common frequency), periwinkle (uncommon to occasional frequency), scallop (uncommon to occasional frequency), and sand dollar (uncommon to occasional frequency). Species noted to a lesser extent included rock crab (uncommon frequency), Northern moon snail (uncommon frequency), bread crumb sponge (uncommon to occasional frequency), and unidentified fish species (uncommon frequency). American lobster, soft shell clam, seastar, and eyed finger sponge were noted in only one or two 5 m sections and had an uncommon frequency. The presence of shell hache was noted along most segments of all four transects.

Macrofloral life was noted throughout all four transects. In most areas the macrofloral life consisted of a mix of false Irish moss and bladderwrack with red alga and eelgrass much less commonly observed. In general the macrofloral cover was sporadic with coverage ranging between 5 and 25%. In areas where cobble and rock comprised a larger percentage of the substrate the algal coverage was as high as 80%. Eelgrass coverage was minimal with no observations of coverage over 10% and often under 5%. Macrofloral debris was noted along segments of all four transects.

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6.0 CLOSING

This document has been prepared and reviewed by the following people:

Prepared by:

[redacted]

Marine Biologist /
Intermediate Project Professional

Reviewed by:

Kerry Higgins, B.Sc., EP
NB/PE Operations Manager /
Senior Project Professional

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7.0 REFERENCES

Mann, K.H. 1982. Ecology of Coastal Waters, A Systems Approach. University of California Press.

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APPENDIX A
Transcript of Video and On-Site Observations

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Table A.1 200m Survey – Transect T1, 16 December, 2014

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **T1 Start**	Anchor-5	Sand (60%), Cobble (20%), Rock (10%), Silt (10%)	Periwinkles (*Littorina* sp) (**U:** 1 individual), Stimpson's Whelk (*Colus stimpsoni*) (**U:** 1 individual)	Bladderwrack (*Fucus vesiculosus*) (40%), False Irish moss (*Mastocarpus stellatus*) (15%), Red Alga (*Furcellaria lumbricalis*) (15%)
5-10	5-10	Sand (60%); Cobble (20%), Rock (10%), Silt (10%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**U:** 2 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (25%), False Irish moss (*Mastocarpus stellatus*) (15%); Red Alga (*Furcellaria lumbricalis*) (15%)
10-15	10-15	Sand (60%); Cobble (20%), Rock (10%), Silt (10%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Northern moon snail (*Euspira heros*)(**U:** 1 individual), Stimpson's Whelk (*Colus stimpsoni*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (25%); False Irish moss (*Mastocarpus stellatus*) (15%), Red Alga (*Furcellaria lumbricalis*) (15%)
15-20	15-20	Sand (70%), Cobble (25%); Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (15%); Red Alga (*Furcellaria lumbricalis*) (15%), Eelgrass (*Zostera marina*) (<5%)
20-25	20-25	Sand (70%), Cobble (25%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Northern moon snail (*Euspira heros*)(**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%); False Irish moss (*Mastocarpus stellatus*) (5%), Red Alga (*Furcellaria lumbricalis*) (5%), Eelgrass (*Zostera marina*) (5%)
25-30	25-30	Sand (70%), Cobble (25%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals); Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (5%), Red Alga (*Furcellaria lumbricalis*) (5%), Eelgrass (*Zostera marina*) (5%)
30-35	30-35	Sand (70%), Cobble (25%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals),Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (5%), Red Alga (*Furcellaria lumbricalis*) (5%), Eelgrass (*Zostera marina*) (5%)
35-40	35-40	Sand (80%), Cobble (10%); Rock (5%); Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 10-15 individuals); Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals); Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (5%), Red Alga (*Furcellaria lumbricalis*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
40-45	40-45	Sand (80%), Cobble (10%), Rock (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (5%), Red Alga (*Furcellaria lumbricalis*) (5%), Eelgrass (*Zostera marina*) (<5%), Macrofloral debris (5%)
45-50	45-50	Sand (80%), Cobble (10%), Rock (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Bread crumb sponge (*Halichondria panacea*) **U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), Red Alga (*Furcellaria lumbricalis*) (15%), False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
50-55	50-55	Sand (80%), Cobble (10%); Rock (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals); Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals); Rock crab (*Cancer irroratus*) (**U:** 1 individual), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), Red Alga (*Furcellaria lumbricalis*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
55-60	55-60	Sand (80%), Cobble (10%), Rock (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Northern moon snail (*Euspira heros*)(**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), Red Alga (*Furcellaria lumbricalis*) (15%), False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
60-65	60-65	Sand (80%), Cobble (10%), Rock (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals); Periwinkles (*Littorina* sp) (**O:** 2-5 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), Red Alga (*Furcellaria lumbricalis*) (15%); False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
65-70	65-70	Sand (80%), Cobble (10%), Rock (5%); Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%); Red Alga (*Furcellaria lumbricalis*) (15%), False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
70-75	70-75	Sand (80%), Cobble (10%); Rock (5%); Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%); Eelgrass (*Zostera marina*) (5%); Macrofloral debris (5%)
75-80	75-80	Sand (90%), Cobble (5%); Silt (5%)	Hermit crab (*Pagarus acadianus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%); False Irish moss (*Mastocarpus stellatus*) (5%); Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
80-85	80-85	Sand (90%); Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**U:** 2 individuals), Unidentified fish species (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
85-90	85-90	Sand (90%); Cobble (5%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
90-95	90-95	Sand (90%); Cobble (5%), Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 5-10 individuals), Hermit crab (*Pagarus acadianus*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (5%); Macrofloral debris (5%)
95-100	95-100	Sand (95%); Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%)
100-105	100-105	Sand (95%); Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 2-5 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%); Macrofloral debris (5%)
105-110	105-110	Sand (95%), Silt (5%)	Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
110-115	110-115	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Perwinkles (*Littorina* sp) (**O:** 2-5 individuals), Unidentified fish species (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Eelgrass (*Zostera marina*) (5%), Macrofloral debris (5%)
115-120	115-120	Sand (95%), Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 2-5 individuals)	False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
120-125	120-125	Sand (95%), Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 2-5 individuals), Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%); Macrofloral debris (5%)
125-130	125-130	Sand (95%), Silt (5%)	Unidentified fish species (**U:** 1 individual)	False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (<5%)
130-135	130-135	Sand (95%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals); Perwinkles (*Littorina* sp) (**O:** 5-10 individuals); American lobster (*Homarus americanus*) (**U:** 1 individual), Northern moon snail (*Euspira heros*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (<5%)
135-140	135-140	Sand (95%), Silt (5%)	Shell hache	False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
140-145	140-145	Sand (95%), Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 2-5 individuals)	False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (<5%); Macrofloral debris (<5%)
145-150	145-150	Sand (95%), Silt (5%)	Rock crab (*Cancer irroratus*) (**U:** 1 individual); Hermit crab (*Pagarus acadianus*) (**U:** 1 individual); Shell hache	Macrofloral debris (5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
150-155	150-155	Sand (95%), Silt (5%)	Periwinkles (*Littorina* sp) (**O:** 2-5 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%); Bladderwrack (*Fucus vesiculosus*) (5%), Macrofloral debris (5%), Eelgrass (*Zostera marina*) (<5%)
155-160	155-160	Sand (95%), Silt (5%)	Periwinkles (*Littorina* sp.) (**O:** 2-5 individuals), Northern moon snail (*Euspira heros*) (**U:** 1 individual)	False Irish moss (*Mastocarpus stellatus*) (10%), Bladderwrack (*Fucus vesiculosus*) (5%), Macrofloral debris (5%); Eelgrass (*Zostera marina*) (<5%)
160-165	160-165	Sand (95%); Silt (5%)	Northern moon snail (*Euspira heros*) (**U:** 2 individuals) , Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Bladderwrack (*Fucus vesiculosus*) (5%), Macrofloral debris (5%), Eelgrass (*Zostera marina*) (<5%)
165-170	165-170	Sand (95%); Silt (5%)	Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Soft shell clam (*Mya arenaria*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%), Eelgrass (*Zostera marina*) (<5%)
170-175	170-175	Sand (95%), Silt (5%)	Periwinkles (*Littorina* sp) (**O:** 5-10 individuals), Northern moon snail (*Euspira heros*) (**O:** 3 individuals), Soft shell clam (*Mya arenaria*) (**U:** 2 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
175-180	175-180	Sand (95%), Silt (5%)	Periwinkles (*Littorina* sp) (**O:** 5-10 individuals), Northern moon snail (*Euspira heros*) (**U:** 2 individuals), Rock crab (*Cancer irroratus*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
180-185	180-185	Sand (95%); Silt (5%)	Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Eyed finger sponge (*Halichona oculata*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Bladderwrack (*Fucus vesiculosus*) (5%)
185-190	185-190	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Shell hache	Eelgrass (*Zostera marina*) (5%)
190-155	190-155	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Northern moon snail (*Euspira heros*) (**U:** 2 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
195-200 **T1 End**	195-200	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**U:** 1 individual)	Macrofloral debris (5%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).

Table A.2 200m Survey – Transect T2, 16 December, 2014

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **T2 Start**	Anchor-5	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals), Northern moon snail (*Euspira heros*) (**U:** 1 individual), Shell hache	Macrofloral debris (5%)
5-10	5-10	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals), Soft shell clam (*Mya arenaria*) (**U:** 1 individual), Shell hache	Macrofloral debris (5%)
10-15	10-15	Sand (95%), Silt (5%)	Rock crab (*Cancer irroratus*) (**O:** 3 individuals), Shell hache	Macrofloral debris (5%)
15-20	15-20	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals), Rock crab (*Cancer irroratus*) (**U:** 2 individuals)	Macrofloral debris (5%)
20-25	20-25	Sand (90%); Rock (5%), Silt (5%)	Rock crab (*Cancer irroratus*) (**U:** 1 individual)	Macrofloral debris (5%)
25-30	25-30	Sand (90%); Rock (5%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals)	Macrofloral debris (5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
30-35	30-35	Sand (90%); Rock (5%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals); Northern moon snail (*Euspira heros*) (**U:** 1 individual), Shell hache	Macrofloral debris (5%)
35-40	35-40	Sand (90%), Rock (5%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals), Rock crab (*Cancer irroratus*) (**O:** 3 individuals)	Macrofloral debris (5%)
40-45	40-45	Sand (90%), Rock (5%), Silt (5%)	Perwinkles (*Littorina* sp) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals), Rock crab (*Cancer irroratus*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
45-50	45-50	Sand (80%); Cobble (10%), Rock (5%); Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals)	False Irish moss (*Mastocarpus stellatus*) (15%)
50-55	50-55	Sand (80%), Cobble (10%); Rock (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**O:** 2-5 individuals)	False Irish moss (*Mastocarpus stellatus*) (15%)
55-60	55-60	Sand (90%); Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
60-65	60-65	Sand (90%); Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
65-70	65-70	Sand (90%); Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual)	False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
70-75	70-75	Sand (90%), Cobble (5%), Silt (5%)	Perwinkles (*Littorina* sp.) (**O:** 5-10 individuals); Scallop (*Placopecten magellanicus*) (**U:** 2 individuals)	False Irish moss (*Mastocarpus stellatus*) (10%); Macrofloral debris (5%)
75-80	75-80	Sand (90%), Cobble (5%), Silt (5%)	Northern moon snail (*Euspira heros*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
80-85	80-85	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
85-90	85-90	Sand (90%), Cobble (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
90-95	90-95	Sand (80%), Cobble (15%), Silt (5%)	Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
95-100	95-100	Sand (80%), Cobble (15%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 5-10 individuals), Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals); Bread crumb sponge (*Halichondria panacea*) (**O:** 2-5 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
100-105	100-105	Sand (80%), Cobble (15%); Silt (5%)	Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Northern moon snail (*Euspira heros*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
105-110	105-110	Sand (80%), Cobble (15%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
110-115	110-115	Sand (75%), Cobble (20%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Northern moon snail (*Euspira heros*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (5%)
115-120	115-120	Sand (75%), Cobble (20%), Silt (5%)	Northern moon snail (*Euspira heros*) (**O:** 5-10 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual), Unidentified fish species (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Bladderwrack (*Fucus vesiculosus*) (10%); Macrofloral debris (5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
120-125	120-125	Sand (75%), Cobble (20%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (5%)
125-130	125-130	Sand (75%); Cobble (20%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	False Irish moss (*Mastocarpus stellatus*) (30%), Bladderwrack (*Fucus vesiculosus*) (25%); Macrofloral debris (5%)
130-135	130-135	Sand (75%), Cobble (20%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (30%), Bladderwrack (*Fucus vesiculosus*) (25%), Macrofloral debris (5%)
135-140	135-140	Sand (60%), Cobble (30%); Rock (5); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Unidentified fish species (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (35%), Bladderwrack (*Fucus vesiculosus*) (30%); Macrofloral debris (5%)
140-145	140-145	Sand (60%), Cobble (30%); Rock (5), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Shell hache	False Irish moss (*Mastocarpus stellatus*) (40%), Bladderwrack (*Fucus vesiculosus*) (35%), Macrofloral debris (5%)
145-150	145-150	Sand (60%); Cobble (30%); Rock (5), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Unidentified fish species (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (40%), Bladderwrack (*Fucus vesiculosus*) (35%), Macrofloral debris (5%)
150-155	150-155	Sand (60%), Cobble (30%); Rock (5); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Unidentified fish species (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (40%); Bladderwrack (*Fucus vesiculosus*) (35%), Macrofloral debris (5%)
155-160	155-160	Sand (60%), Cobble (30%), Rock (5); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Unidentified fish species (**O:** 10-15 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual)	False Irish moss (*Mastocarpus stellatus*) (20%), Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (5%)
160-165	160-165	Sand (60%), Cobble (30%); Rock (5), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Bread crumb sponge (*Halichondria panacea*) (**O:** 10-15 individuals); Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (20%), Bladderwrack (*Fucus vesiculosus*) (15%); Macrofloral debris (5%)
165-170	165-170	Sand (60%), Cobble (30%); Rock (5), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (20%), Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (5%)
170-175	170-175	Sand (60%); Cobble (30%); Rock (5), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (20%); Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (5%)
175-180	175-180	Sand (60%), Cobble (30%), Rock (5); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Unidentified fish species (**U:** 1 individual)	False Irish moss (*Mastocarpus stellatus*) (20%), Bladderwrack (*Fucus vesiculosus*) (15%); Macrofloral debris (5%)
180-185	180-185	Sand (75%), Cobble (20%); Silt (5%)	Northern moon snail (*Euspira heros*) (**U:** 1 individual), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (5%)
185-190	185-190	Sand (75%); Cobble (20%), Silt (5%)	Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (5%)
190-195	190-195	Sand (75%), Cobble (20%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (20%), Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (5%)
195-200 **T2 End**	195-200	Sand (75%), Cobble (20%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (5%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below)

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Table A.3 200m Survey – Transect TT1, 16 December, 2014

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **TT1 Start**	Anchor-5	Sand (85%), Cobble (10%); Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (5%)
5-10	5-10	Sand (90%); Cobble (5%), Silt (5%)	Shell hache	Macrofloral debris (5%)
10-15	10-15	Sand (95%), Silt (5%)	Shell hache	Macrofloral debris (5%)
15-20	15-20	Sand (95%); Silt (5%)	Shell hache	Macrofloral debris (5%)
20-25	20-25	Sand (95%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), Macrofloral debris (5%)
25-30	25-30	Sand (90%); Cobble (5%); Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%); Macrofloral debris (5%)
30-35	30-35	Sand (90%); Cobble (5%), Silt (5%)	Rock crab (*Cancer irroratus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (5%)
35-40	35-40	Sand (85%), Cobble (10%), Silt (5%)	Bread crumb sponge (*Halichondria panacea*) (**O:** 10-15 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
40-45	40-45	Sand (85%), Cobble (10%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Bread crumb sponge (*Halichondria panacea*) (**O:** 10-15 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
45-50	45-50	Sand (85%); Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Rock crab (*Cancer irroratus*) (**U:** 1 individual); Sea star (*Asterias* sp), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
50-55	50-55	Sand (85%); Cobble (10%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%); False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (5%)
55-60	55-60	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Bread crumb sponge (*Halichondria panacea*) (**O:** 2-5 individuals)	Bladderwrack (*Fucus vesiculosus*) (20%); False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
60-65	60-65	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Rock crab (*Cancer irroratus*) (**U:** 2 individuals); Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual)	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
65-70	65-70	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Rock crab (*Cancer irroratus*) (**U:** 1 individual); Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
70-75	70-75	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%); Macrofloral debris (5%)
75-80	75-80	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals); Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (5%)
80-85	80-85	Sand (85%), Cobble (10%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 2 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (5%)
85-90	85-90	Sand (85%), Cobble (10%), Silt (5%)	Rock crab (*Cancer irroratus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (10%); Macrofloral debris (5%)
90-95	90-95	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals); Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (10%); Macrofloral debris (5%)
95-100	95-100	Sand (85%), Cobble (10%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
100-105	100-105	Sand (85%), Cobble (10%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
105-110	105-110	Sand (85%), Cobble (10%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individuals); Unidentified fish species (**U:** 1 individual); Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
110-115	110-115	Sand (85%); Cobble (10%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (10%), Macrofloral debris (5%)
115-120	115-120	Sand (85%), Cobble (10%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals)	Bladderwrack (*Fucus vesiculosus*) (10%); False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (5%)
120-125	120-125	Sand (90%), Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
125-130	125-130	Sand (90%), Cobble (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 2-5 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
130-135	130-135	Sand (90%), Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals); Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
135-140	135-140	Sand (90%); Cobble (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**O:** 5-10 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%); Macrofloral debris (<5%)
140-145	140-145	Sand (90%), Cobble (5%), Silt (5%)	Rock crab (*Cancer irroratus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%); False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
145-150	145-150	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Scallop (*Placopecten magellanicus*) (**U:** 1 individual)	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
150-155	150-155	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals); Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Sea star (*Asterias* sp), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
155-160	155-160	Sand (90%), Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%); False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
160-165	160-165	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%); False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
165-170	165-170	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals); Sand dollar (*Echinarachnius parma*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%); Macrofloral debris (<5%)
170-175	170-175	Sand (90%), Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%); Macrofloral debris (<5%)
175-180	175-180	Sand (90%), Cobble (5%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
180-185	180-185	Sand (90%), Cobble (5%), Silt (5%)	Northern moon snail (*Euspira heros*)(**U:** 1 individual)	Bladderwrack (*Fucus vesiculosus*) (<5%); False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
185-190	185-190	Sand (90%); Cobble (5%), Silt (5%)	Scallop (*Placopecten magellanicus*) (**U:** 1 individual); Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
190-195	190-195	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
195-200 **TT1 End**	195-200	Sand (90%), Cobble (5%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 10-15 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%); False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below).

Table A.4 200m Survey – Transect TT2, 16 December, 2014

Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
0-5 **TT2 Start**	Anchor-5	Sand (95%), Silt (5%)	Shell hache	Eelgrass (*Zostera marina*) (10%)
5-10	5-10	Sand (95%), Silt (5%)	Shell hache	Eelgrass (*Zostera marina*) (10%), Bladderwrack (*Fucus vesiculosus*) (<5%); False Irish moss (*Mastocarpus stellatus*) (<5%)
10-15	10-15	Sand (95%), Silt (5%)	Shell hache	Eelgrass (*Zostera marina*) (10%); Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%)
15-20	15-20	Sand (90%), Cobble (5%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (10%); Eelgrass (*Zostera marina*) (5%)
20-25	20-25	Sand (80%), Cobble (15%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (15%), Eelgrass (*Zostera marina*) (10%)
25-30	25-30	Sand (80%); Cobble (15%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (15%); Eelgrass (*Zostera marina*) (10%)
30-35	30-35	Sand (80%), Cobble (15%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (20%); Eelgrass (*Zostera marina*) (5%)
35-40	35-40	Sand (80%), Cobble (15%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%); False Irish moss (*Mastocarpus stellatus*) (20%), Eelgrass (*Zostera marina*) (5%)
40-45	40-45	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%); False Irish moss (*Mastocarpus stellatus*) (10%)
45-50	45-50	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (10%), Eelgrass (*Zostera marina*) (5%)
50-55	50-55	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (10%), Eelgrass (*Zostera marina*) (5%)
55-60	55-60	Sand (85%), Cobble (10%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (10%), Eelgrass (*Zostera marina*) (<5%)
60-65	60-65	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (20%), False Irish moss (*Mastocarpus stellatus*) (15%), Eelgrass (*Zostera marina*) (<5%)
65-70	65-70	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%), False Irish moss (*Mastocarpus stellatus*) (10%)
70-75	70-75	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%); Eelgrass (*Zostera marina*) (<5%)
75-80	75-80	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%); Eelgrass (*Zostera marina*) (<5%)
80-85	80-85	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 10-15 individuals)	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (<5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
85-90	85-90	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 10-15 individuals), Northern moon snail (*Euspira heros*)(**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%); False Irish moss (*Mastocarpus stellatus*) (5%), Eelgrass (*Zostera marina*) (<5%)
90-95	90-95	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals), Shell hache	Macrofloral debris (5%)
95-100	95-100	Sand (95%), Silt (5%)	Sand dollar (*Echinarachnius parma*) (**O:** 5-10 individuals)	Macrofloral debris (5%)
100-105	100-105	Sand (95%); Silt (5%)	Shell hache	Macrofloral debris (5%)
105-110	105-110	Sand (95%), Silt (5%)	Shell hache	Macrofloral debris (5%)
110-115	110-115	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Shell hache	Macrofloral debris (5%)
115-120	115-120	Sand (95%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%); Macrofloral debris (<5%)
120-125	120-125	Sand (95%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Rock crab (*Cancer irroratus*) (**U:** 1 individual), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%); Macrofloral debris (<5%)
125-130	125-130	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (<5%), False Irish moss (*Mastocarpus stellatus*) (<5%), Macrofloral debris (<5%)
130-135	130-135	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%); Bladderwrack (*Fucus vesiculosus*) (5%), Eelgrass (*Zostera marina*) (<5)
135-140	135-140	Sand (95%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 2-5 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%); Macrofloral debris (<5%)
140-145	140-145	Sand (95%); Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%), False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (<5%)
145-150	145-150	Sand (95%), Silt (5%)	Shell hache	Bladderwrack (*Fucus vesiculosus*) (5%); False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (<5%)
150-155	150-155	Sand (85%); Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (10%), Bladderwrack (*Fucus vesiculosus*) (5%), Macrofloral debris (<5%); Eelgrass (*Zostera marina*) (<5%)
155-160	155-160	Sand (85%), Cobble (10%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Shell hache	Bladderwrack (*Fucus vesiculosus*) (10%), False Irish moss (*Mastocarpus stellatus*) (5%), Macrofloral debris (<5%); Eelgrass (*Zostera marina*) (<5)
160-165	160-165	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Bread crumb sponge (*Halichondria panacea*) (**U:** 1 individual); Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%); Bladderwrack (*Fucus vesiculosus*) (10%); Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)
165-170	165-170	Sand (85%), Cobble (10%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals), Scallop (*Placopecten magellanicus*) (**U:** 2 individuals), Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Bladderwrack (*Fucus vesiculosus*) (10%); Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)
170-175	170-175	Sand (85%), Cobble (10%); Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**O:** 5-10 individuals); Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%); Bladderwrack (*Fucus vesiculosus*) (10%), Macrofloral debris (<5%); Eelgrass (*Zostera marina*) (<5%)
175-180	175-180	Sand (80%), Cobble (15%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%); Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)
180-185	180-185	Sand (80%); Cobble (15%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	False Irish moss (*Mastocarpus stellatus*) (15%), Bladderwrack (*Fucus vesiculosus*) (15%), Macrofloral debris (<5%); Eelgrass (*Zostera marina*) (<5%)

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Transect Distance (m)	Transect Tag Numbers	Substrate (Estimated % Coverage)	Macrofaunal Life Observed (Estimated Abundances*)	Macrofloral Life Observed (Estimated % Coverage)
185-190	185-190	Sand (55%), Cobble (40%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (30%); False Irish moss (*Mastocarpus stellatus*) (25%), Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)
190-195	190-195	Sand (55%), Cobble (40%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**), Shell hache	Bladderwrack (*Fucus vesiculosus*) (15%); False Irish moss (*Mastocarpus stellatus*) (15%), Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)
195-200 **TT2 End**	195-200	Sand (55%), Cobble (40%), Silt (5%)	Stimpson's Whelk (*Colus stimpsoni*) (**C**); Shell hache	Bladderwrack (*Fucus vesiculosus*) (30%); False Irish moss (*Mastocarpus stellatus*) (25%), Macrofloral debris (<5%), Eelgrass (*Zostera marina*) (<5%)

*A = Abundant, C = Common, O = Occasional, U = Uncommon (See below)

A = Abundant
Numerous (not quantifiable) observations made throughout the entire 5 m segment.

C = Common
Numerous (not quantifiable) observations made intermittently along the 5 m segment.

O = Occasional
Quantifiable observations made intermittently along the 5 m segment.

U = Uncommon
Quantifiable observations made infrequently along the 5 m segment.

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APPENDIX B
Annotated Species List

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Classification	Common Name	Scientific Name
Macrofauna		
Crustacea	Rock Crab	*Cancer irroratus*
	Hermit crab	*Pagarus acadianus*
	American Lobster	*Homarus americanus*
Enchinodermata	Seastar	*Asterias* sp.
	Sand Dollar	*Echinarachnius parma*
Gastropoda	Periwinkle	*Littorina* sp.
	Stimpson's Whelk	*Colus stimpsoni*
Mollusca	Scallop	*Placopecten magellanicus*
	Northern moon snail	*Euspira heros*
	Soft shell clam	*Mya arenaria*
Porifera	Bread crumb sponge	*Halichondria panacea*
	Eyed finger sponge	*Haliclona oculata*
Miscellaneous	Unidentified Fish	-----
Macroflora		
Angiosperms	Eelgrass	*Zostera marina*
Phaeophyta	Bladderwrack	*Fucus vesiculosus*
Rhodophyta	False Irish Moss	*Mastocarpus stellatus*
	------	*Furecellaria lumbricalis*

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APPENDIX C
Limitations

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LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:

    1. The Standard Terms and Conditions which form a part of our Professional Services Contract.
    2. The Scope of Services.
    3. Time and Budgetary limitations as described in our Contract.
    4. The Limitations stated herein.

2. The report has been prepared in accordance with generally accepted environmental study practices. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The objective of this report was solely to characterize the seabed footprint of the proposed Project area.
4. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. AMEC accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

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13 March 2014

TV141203

Troy Young
Environmental Services
Public Works and Government Services Canada
PO Box 2247
1713 Bedford Row
Halifax, NS B3J 3C9

Dear Mr Young,

Re: Ocean Dredging Disposal Site Stability and Dispersion, Caribou Ferry Terminal

AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), was retained by Public Works and Government Services Canada (PWGSC), on behalf of Transport Canada, to conduct sediment transport modelling and provide professional opinion regarding the zone of influence of the proposed dredged sediment disposal operations near Caribou Harbour, Pictou County, Nova Scotia.

The objective of this letter is to present our assessment of the following:

- initial sediment footprint at the disposal site;
- long term stability of the sediment mound;
- total suspended sediment (TSS) concentrations at the disposal site as well as in the far field;
- suspended sediment plume trajectory to help assess whether the dredged material discharged at the proposed disposal site is likely to be transported toward sensitive local marine habitats; and
- comparison of the disposed sediment fate for two possible disposal sites, at the historic 1981 and 2007 disposal locations.

This letter is based on an assessment of the pertinent coastal processes (waves, currents, tides and littoral drift) that influence the movement of dredged material and the physical characteristics of the sediment in the region of the proposed disposal site. Information was obtained from the latest sediment sampling study (AMEC 2008), analysis of tidal currents from DFO's WebTide model (Dupond et al., 2002), and incident wave statistics derived from the MSC50 hindcast of hourly wind and wave climate data by Meteorological Services Canada (Swail et al., 2006) for the period of 1954 to 2009. This information was used to perform a modelling assessment of the pertinent hydrodynamic and sediment transport processes, thus yielding quantitative estimates of the potential zone of influence in the vicinity of the disposal site as well as tens of kilometres away from the site.

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Dredging and Disposal Operations Description

The Caribou Ferry Terminal is located in Pictou County, on Nova Scotia's Northumberland Strait shore at Latitude 45°44'19" N and Longitude 62°41'20" W.

The proposed project consists of re-dredging the channel approaching the ferry terminal. Approximately 20,000 cubic metres (m^3) place measure of sediment will be removed and disposed at sea using a dump scow or a barge. There are two disposal sites being considered, based on the historic disposal sites in 1981 and 2007 (Figure 1). The two sites are located at 45.748° N 62.661333° W (1981 site) and 45.755° N 62.648883° W (2007 site), and are about 6 metres (m) deep and 11 m deep, respectively (Lower Normal Tide). The sites are located approximately 2.4 kilometres (km) and 3.6 km from the Caribou Ferry Terminal, with the 2007 site being further away and in deeper water compared to the 1981 site.

The disposed sediment composition was characterized based on the latest available sediment sampling program. Sediment samples were collected from the proposed dredging areas (locations shown in Appendix A, Figure 7 to Figure 13) at the Caribou Ferry Terminal by AMEC on June 2, 2008. Results for grain sizes are shown in Table 1. In most areas, the composition of sediments is predominantly sand, accounting for an average of approximately 51.5% of all samples. Silt and clay constitute the majority of the remaining material, accounting for an average of 27.9% and 16.9% of the samples respectively, while gravel is relatively scarce at only 3.6%.

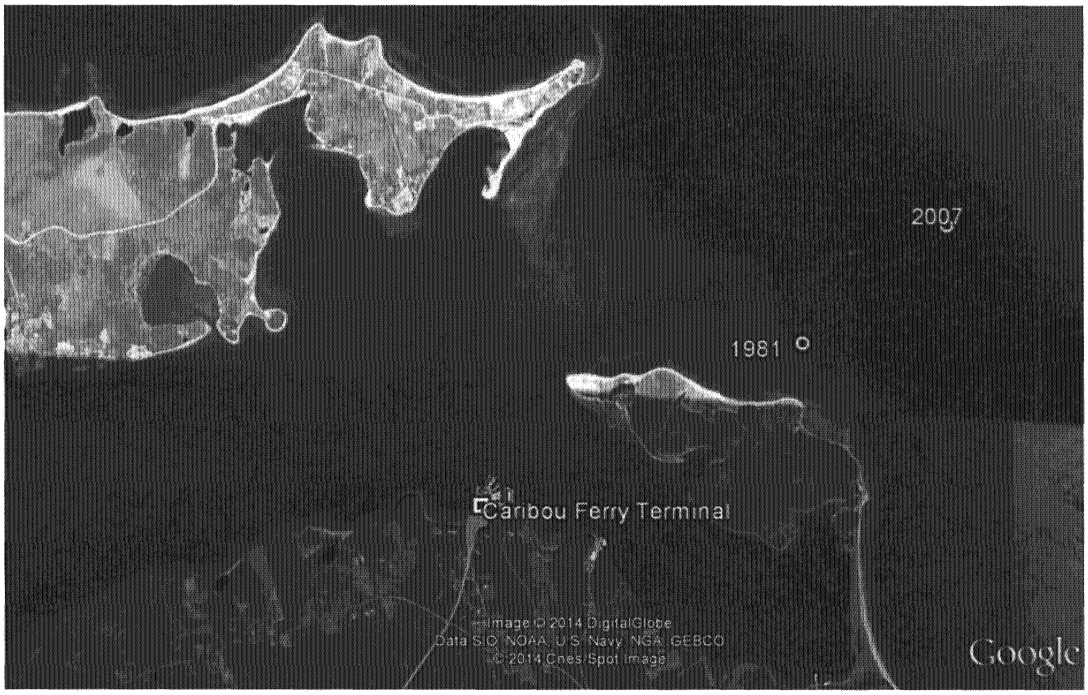


Figure 1 Locations of the two historic disposal sites from 1981 and 2007.

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Table 1 **Sediment samples from the AMEC Marine Sediment Sampling Program (MSSP) conducted at Caribou Ferry Terminal in 2008.**

Sample ID	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
WBA-5	0.3	84	9.1	7
WBA-16	4.1	11	54	31
WBA-21	3.5	15	54	28
WBA-27	1.7	29	43	25
WBA-34	2.4	35	36	26
WBA-39	3	14	48	34
A-1-4	4.5	19	47	30
A-2-6	0.5	46	35	18
B-1-2	29	64	3.6	3.3
B-2-5	0.3	99	0.1	1.1
B-2-10	0.1	98	0.1	1.6
B-2-14	0.1	98	0.1	1.6
WBA-10 surf.	1.6	73	15	10
WBA-10 sub.	0.5	77	13	9.6
WBA-17 surf.	4.8	34	42	20
WBA-17 sub.	1.6	28	47	24
AVERAGE	**3.6**	**51.5**	**27.9**	**16.9**

No information is available for the disposal site, but according to a broad descriptive study of the particle distribution in the sediments of the Gulf of St. Lawrence by Loring and Nota (1973), the sediments in the area of the disposal site can be expected to be mainly coarse sand.

Based on previous similar dredging programs for Caribou Ferry Terminal, it is assumed that the dredging and disposal program would result in discrete loads of 50 m^3 sediment (placement measure) being dumped every 2 hours at the disposal site, continuously over approximately 33.3 days. The program could occur any time from July to December, therefore it is necessary to consider the seasonal variability of wind and wave forcing and their contribution to the sediment transport processes.

Coastal Processes and Forcing Scenarios

The fate of the disposed sediment, and particularly the fine fractions of silt and clay, would depend on the capacity of the ocean currents and waves to keep the sediment in suspension and disperse it away from the disposal site. The prevailing transport direction is expected to be influenced by the tidal circulation in the Northumberland Strait, as well as by wind-driven and to a lesser and narrower extent wave-driven currents in the limited shallow areas along the coast.

Based on a review of seasonal variations of wind and waves in the area, and in order to assess the range of possible sediment transport trajectories throughout the seasons when the disposal operations could occur, four different forcing scenarios were selected for analysis:

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- Calm conditions, when the coastal circulation is driven by tides only. This scenarios is expected to provide a baseline, with likely the least amount of spatial dispersion;
- Southwesterly winds (most frequent moderate speed of 5 metres per second [m/s]) in addition to the tidal circulation. This scenario represents the most frequent conditions for the summer season (July);
- Northwesterly winds and incident waves (most frequent moderate wind speed of 5 m/s, significant wave height of 0.5 m with peak periods in the wind-wave range) in addition to the tidal circulation. This scenario represents the most frequent conditions for the winter season (December);
- Northeasterly winds and incident waves (moderate wind speed of 5 m/s, significant wave height of 0.5 m with peak periods in the wind-wave range) in addition to the tidal circulation. This scenario represents relatively less frequent conditions that could result in sediment transport toward the west to provide a comparison with the more frequent scenarios;

Two separate disposal scenarios were considered for each forcing scenario, one corresponding to each disposal location, therefore yielding a total of eight scenarios. The nearfield mixing processes were characterized using the ADDAMS STFATE (Short Term Fate) model at the two disposal sites. Furthermore, the sediment transport over the entire disposal program over 33.3 days was modeled using the Delft3D model, which was allowed to run for an additional week following the end of disposal operations in order to assess the rate at which the suspended sediment concentrations would dissipate in the vicinity of the disposal site.

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Hydrodynamic and Sediment Transport Model

In order to represent the interaction between the tidal currents, wind and wave-driven currents in the coastal zone, as well as the resulting sediment transport, AMEC utilized the two-dimensional module of the Delft3D modeling system. The Delft3D suite consists of a highly-integrated set of modules to compute 2D or 3D ocean currents, as well as to employ the advection-diffusion equations for computations of sediment transport. The discharged material was represented using a single non-cohesive sediment fraction (representing sand and gravel), and two cohesive sediment fractions representing silt and clay.

The model bathymetry was derived from depth data acquired from the Canadian Hydrographic Service (electronic navigational chart CA276286, single beam bathymetry spanning the area from Caribou, NS to the southern coast of PEI). A Cartesian computational grid was generated for the region covered by the depth data, spanning approximately 72 km in the alongshore direction, and 42 km in the cross-shore direction (Figure 2). The grid features a horizontal resolution of 200 m, based on the estimated horizontal extent of the mixing zone at the disposal site. The depth over the computational domain was generated by grid cell averaging and triangular interpolation of the bathymetric data.

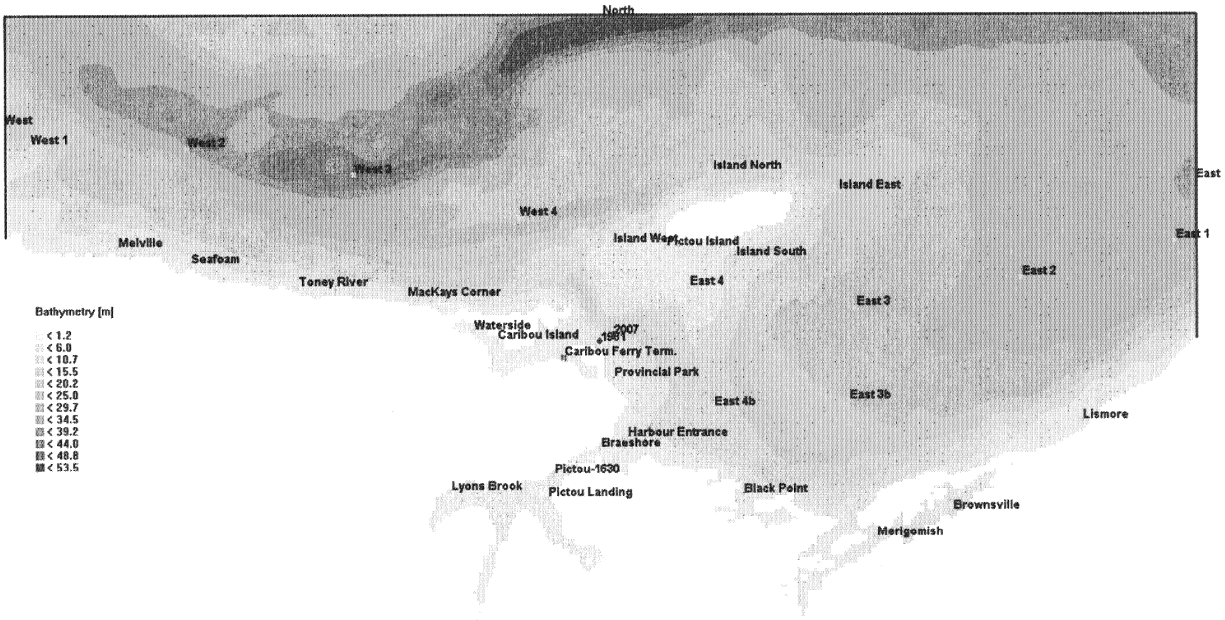


Figure 2 **Model bathymetry and computational grid. Bathymetry source: Canadian Hydrographic Service. The domain is roughly centered on the Caribou Ferry Terminal.**

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The tidal currents and water level variations were reproduced by prescribing harmonic water level variations along the northern model boundary, and harmonic Neumann gradient-type boundary conditions at the lateral boundaries, consistent with the approach from previous successful modeling efforts of this nature conducted by Vitousek et al. (2007), and Roelvink and Walstra (2007). The five most dominant tidal constituents were used, including three semidiurnal and two diurnal constituents (Table 2). The tidal properties and their phases at each end of the northern boundary were extracted from the WebTide model. Current predictions generated by the regional WebTide model were also used as a reference for model calibration.

Table 2 Properties of the five tidal constituents prescribed at the northern open boundary of the model.

Tidal Constituent	Frequency (degree/hour)	Amplitude (m)	Phase Lag Within Domain (degrees)
M2	28.984104	0.622861	34.450591
K1	15.041069	0.214705	4.998889
N2	28.439730	0.106312	17.830205
S2	30.000000	0.138747	36.577428
O1	13.943036	0.222827	3.724096

The date of July 1st was chosen arbitrarily for the beginning of the hydrodynamic simulations, and sediment releases were set to begin on July 3rd. However, the range of modeled scenarios were designed to capture the full range of conditions most frequently observed from July to December, and therefore the results should be viewed in reference to the date of beginning of the actual operations, and not to a specific date. All model simulations were extended for an entire week following the end of disposal of all material, in order to capture the trends and rates of plume dispersal in the absence of further operations.

For the forcing conditions selected, overall the tidal currents are expected to be the dominant factor for sediment resuspension and dispersion, with a smaller contribution by the wind and wave-driven mean flow. The modeled tidal currents at the two potential disposal sites are shown below in Figure 3. The deeper 2007 historic site is expected to have about twice the maximum tidal current magnitude (0.8 m/s or 1.6 knots at spring tide, 0.4 m/s or 0.8 knots at neap tide) compared to the shallower 1981 site (0.45 m/s or 0.9 knots at spring tide, 0.25 m/s or 0.5 knots at neap tide). These currents represent the maximum magnitudes reached during peak flow or ebb tide during normal (non-storm) conditions, however it should be noted that stronger currents could be observed at these locations, especially in stormy conditions.

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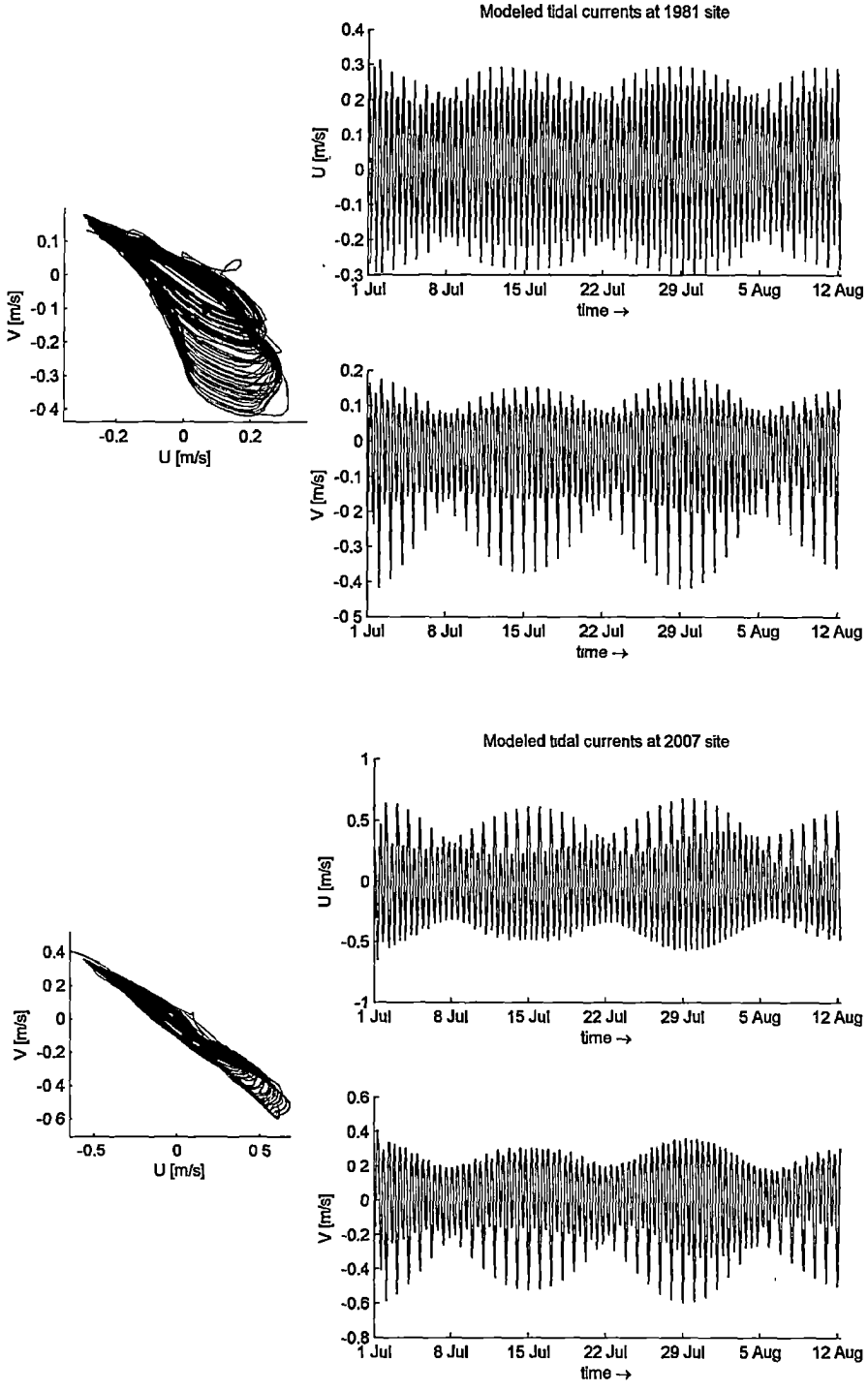


Figure 3 **Modelled tidal currents at the two potential disposal sites. The current magnitude is expected to be higher by about a factor of two at the 2007 site.**

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Sediment Dispersion and Fate Modeling Results

The sediment dispersion and fate modeling proceeded in two stages. In the first stage, the size of the nearfield mixing zone was determined where the momentum imparted by the disposal process dominates over the ambient circulation. In the short-term, the placement of dredged material generally follows a three-step process captured by the STFATE model for individual loads (Bokuniewicz et al., 1978):

- Near field convective descent, during which the material falls under the influence of gravity.
- Mid-field dynamic collapse, when the descending cloud or jet either impacts the bottom or arrives at a level of neutral buoyancy.
- Far-field passive transport-dispersion, when transport and spreading of material are determined more by ambient current and turbulence than by the dynamics of the disposal operation.

The results for individual loads of 50 m^3 indicated that the end of the dynamic collapse phase would create a suspended sediment plume with a diameter of approximately 40 m at the 1981 site, or approximately 60 m at the 2007 site, resulting in material settling within an area with a diameter of the order of 150 to 200 m. Based on these calculations, the sediment source terms for the far-field Delft3D model were defined to occupy a single cell 200 m in size, with each disposal operation lasting for a nominal period of 60 seconds every 2 hours.

Each individual barge disposal is expected to create a mound of sediment with a maximum thickness of up to 2 m, largely consisting of the sand and gravel fractions, as the fine materials are expected to be stripped and transported away from the disposal site. It is impossible to predict the precise shape of the deposit mound at the site resulting from 400 individual loads, as each load would typically be released by the vessel at a slightly different location, with the vessel moving in different directions and in different ambient current speeds. Typically the vessel operators would carry on the disposals following a grid pattern so as to maintain navigability, particularly in shallow coastal areas. Assuming that the disposals would be confined to an area approximately 200 m in diameter, the average deposit thickness within this area would be on the order of 0.3 m, with maximum thicknesses of individual mounds reaching up to 2 m.

Beyond the initial disposal, the tidal currents at both potential disposal sites would be expected to disperse most of the fine sediment relatively rapidly and over a relatively large area. The modelled suspended sediment plume concentrations are plotted for both disposal sites and the four forcing scenarios in Figure 4. The maps show the total suspended sediment (TSS) concentration contours at the end of the 400th disposal operation, therefore representing the maximum instantaneous concentrations expected for each scenario. It is apparent that overall the concentrations fall to levels below 10 mg/L within approximately 3 km or less of the disposal site, and to levels below 2 milligrams per litre (mg/L) within approximately 6 km in all scenarios.

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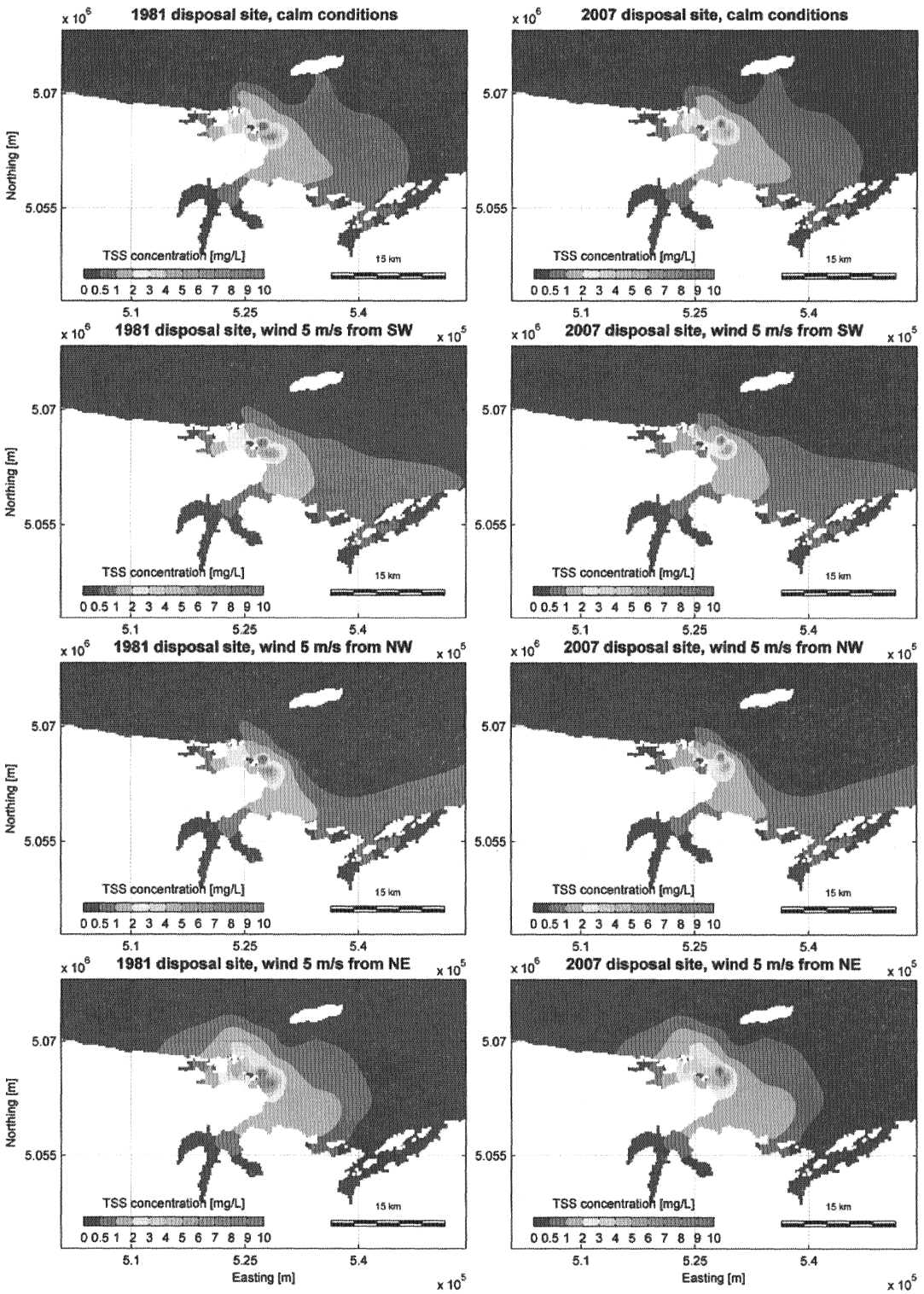


Figure 4 **Modelled TSS concentration contours at the end of disposal operations.**

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Furthermore, the plume trajectories in the vicinity of the disposal sites remain relatively consistent through the different forcing scenarios, however the dispersion of the plume in the very far field (at low concentrations between 0.05-1 mg/L) is ultimately subject to the direction of the coastal circulation. During calm (tidal-driven) conditions the fine sediment plume is dispersed in the northwest-southeast direction, with overall transport trending somewhat toward the south toward Pictou Harbour, and to a lesser extent toward the east reaching the southern coastline of Pictou Island. As could be expected, southwesterly winds contribute toward eastward plume transport along the northern shoreline of Nova Scotia, reaching Lismore and beyond. The plume trajectory under northwesterly winds and waves is similarly eastward, but confined closer to the Nova Scotia shoreline.

Finally, northeasterly winds and waves contribute to westward plume trajectories, with the low plume concentrations (0.5-1 mg/L) reaching as far as MacKays Corner. Apart from the first 3 to 6 km outside Caribou Harbour, where higher TSS concentrations are seen for the 1981 disposal site, the far-field plume trajectories do not seem to exhibit significant differences between the two different disposal sites.

The predicted TSS concentrations are relatively low, comparable to background suspended sediment concentrations measured in the nearby Pictou Harbour in the range of 2.1 to 8.5 mg/l (Dalziel et al., 1993). Time series of modeled TSS levels at the Caribou Harbour Entrance and selected virtual monitoring stations (Figure 5) indicate that the plume concentrations would be below 8 mg/L at the Caribou Harbour Entrance for all forcing scenarios and both potential disposal sites. Concentrations at MacKays Corner are expected to reach 1 mg/L only under the easterly wind and wave scenario (both 1981 and 2007 sites). The station south of Pictou Island is subject to relatively low TSS concentrations below 1 mg/L, and Pictou Harbour itself would experience levels between 1 to 2 mg/L for all the forcing conditions.

Only a small fraction of the disposed fine sediments are expected to settle on the sea floor, with most of them being transported up to tens of kilometres away from the disposal site. In order to allow as much settling time as possible, sediment deposit thicknesses were captured one week after the end of disposal operations in the Delft3D model, and the results are plotted in Figure 6. These results indicate that aside from the main sand and gravel deposit at the disposal site, there would be relatively little deposition of fine material, with silt and clay deposit thicknesses of the order of 1 millimetre (mm) found up to approximately 5 km in the southeast and northwest directions for the 2007 site, and approximately 4 km for the 1981 site. This far-field deposition pattern for the fine sediments is consistent with the overall direction of the tidal circulation near the coastline, and the lack of deposition is to be expected given that the natural sediment in the area is composed predominantly of sand. The far-field fine sediment deposit thickness maps indicate that there is relatively little difference between the two disposal sites on the potential for deposition within Caribou Harbour. The sediment deposits are more widely dispersed in the vicinity (first several hundred meters) of the 2007 site, where the area with deposit thicknesses of at least 1 centimetre (cm) is at least twice as wide as that for the 1981 site.

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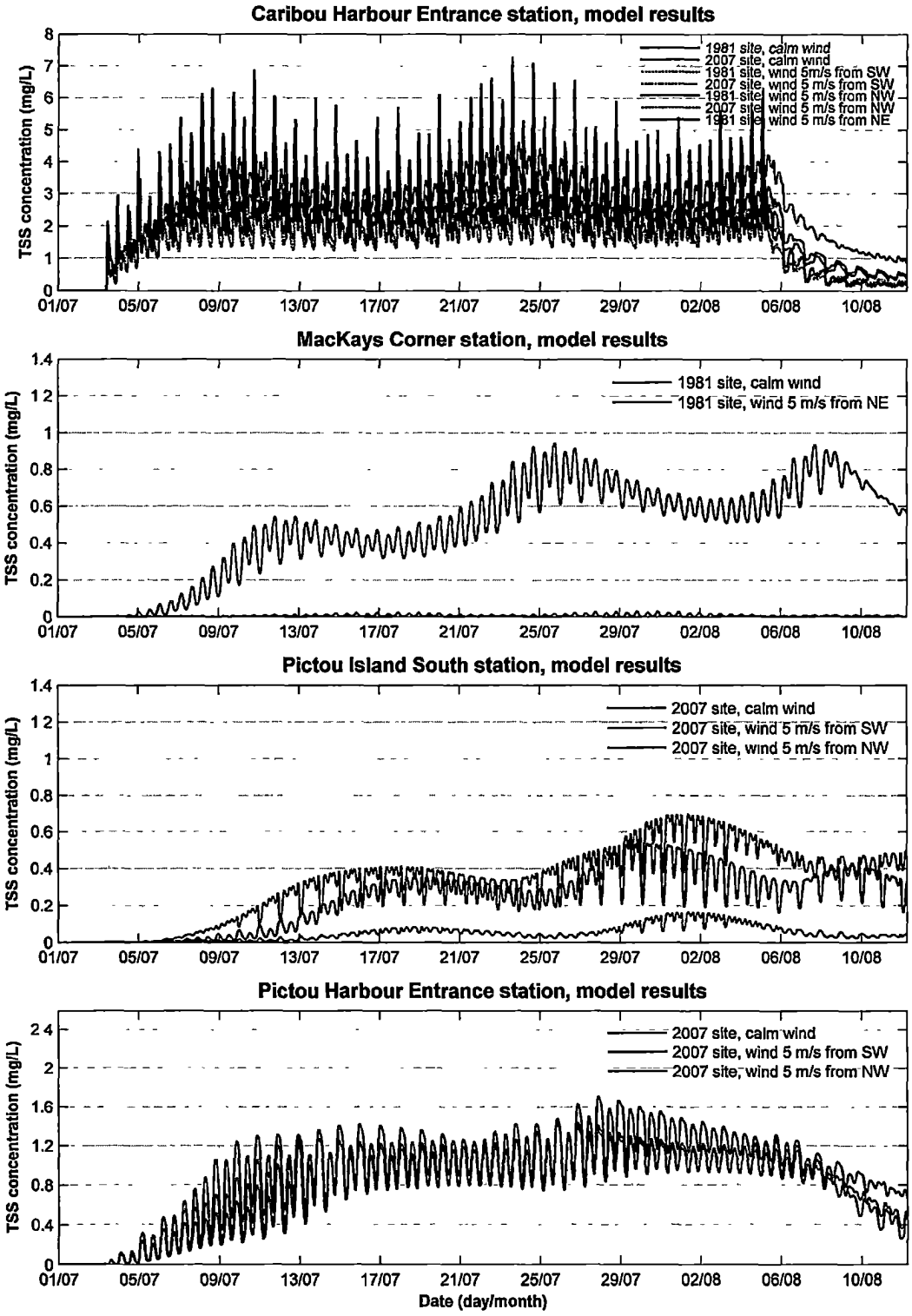


Figure 5 Modelled TSS concentration time series at nearby monitoring stations.

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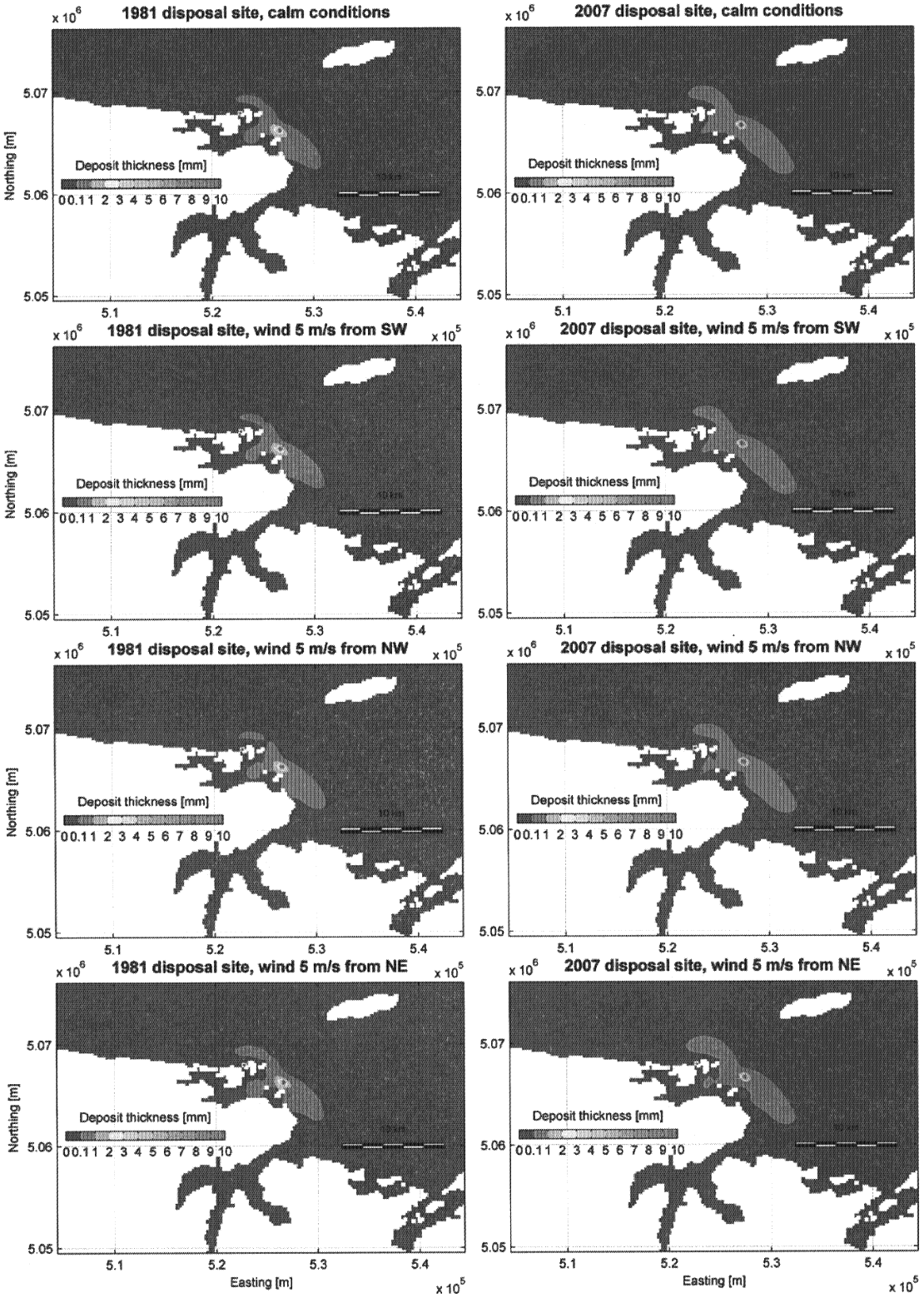


Figure 6 Modelled sediment deposit thicknesses 7 days after end of disposal.

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Regarding the long term fate of the resulting sand and gravel deposit at the disposal site, the stability and dispersion of the deposit will depend on the combined transport by waves and currents over the year. When the combined shear of waves and currents exceeds a critical threshold that depends on the water depth and on the nature and grain size of the material, particles are set into motion on the seabed or possibly put in suspension. The transport of the material in the deposit is therefore an episodic, intermittent process that is significantly more effective during storm conditions, therefore average transport rates based on the most frequent conditions are likely to overestimate the time necessary to rework the disposed sediment. Considering the order of magnitude of the transport during normal conditions, it is expected that the main deposit at the disposal site consisting of approximately 11,000 m^3 sand and gravel would be reworked within a period of one to several decades.

Conclusions and Recommendations

Approximately 20,000 m^3 of material is proposed to be dredged from the Caribou Ferry Terminal entrance channel. The dredged material is proposed to be disposed at an offshore site located about 2 to 3 km east from the terminal at one of two possible sites: the historic 1981 site or the historic 2007 disposal site. The present analysis aims to identify and characterize the difference in outcomes in terms of suspended sediment plume trajectories and sediment deposits for the two potential sites.

The dredged material is expected to be extracted with a clamshell dredge and discharged with a bottom scow barge at the disposal site. Based on previous maintenance dredging operations in Caribou Harbour, it was assumed that the barge capacity would be 50 m^3 of sediment, requiring 400 individual loads to dispose of the full dredged volume. In order to model the far-field dispersion and fate of the discharged sediment, it was assumed that the dredging program would be carried on continuously for 33.3 days, with a barge load being discharged every 2 hours. Therefore the modeled discharges occurred 12 times a day, during every stage of the tidal cycle. The simulated period included over 40 days of model time, in order to allow for the sediment plume to be tracked for at least a week after the end of disposal operations. Furthermore, the simulations were repeated for four different wind and wave forcing conditions: calm conditions (tides only), southwesterly winds (July conditions), northwesterly winds and waves (December conditions) and northeasterly winds and waves.

The modeling results indicate that the deeper 2007 historic site is expected to have about twice the maximum tidal current magnitude (0.8 m/s or 1.6 knots at spring tide, 0.4 m/s or 0.8 knots at neap tide) compared to the shallower 1981 site (0.45 m/s or 0.9 knots at spring tide, 0.25 m/s or 0.5 knots at neap tide). These currents represent the maximum magnitudes reached during peak flow or ebb tide during normal (non-storm) conditions, however stronger currents could be observed at these locations, especially in stormy conditions.

The effects of the proposed disposal of the dredged material were assessed in the vicinity of the disposal site as well as tens of kilometres away. At the disposal site, a plume with a diameter in the range of 150 to 200 m and TSS concentrations of about 50 mg/L are expected. The plume

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is expected to disperse relatively quickly with fine material concentrations falling below 10 mg/L within 3 km, and below 2 mg/L within 6 km for all scenarios. These concentrations are comparable to the background TSS concentrations of 2.1 to 8.5 mg/L (Dalziel et al., 1993).

Overall the fine sediment plumes are dispersed more rapidly in the nearfield for the 2007 site, resulting in slightly lower TSS concentrations in the first 3 km compared to the 1981 site. It should be noted that TSS levels are predicted to be slightly higher in Caribou Harbour for the 1981 site compared to the 2007 site, although they would still likely remain below 10 mg/L under the moderate forcing conditions considered here. In the far field the overall plume extent and trajectory are quite similar for the two disposal sites, with some differences in plume trajectories under different forcing scenarios. In general the suspended sediment plume is expected to spread in the northwest and southeast directions from the disposal site, traveling south and reaching the entrance of Pictou Harbour at concentrations around 1-2 mg/L in all scenarios. Under the most frequent July conditions (southwesterly winds), the diluted plume (0.5-1 mg/L) would be transported eastward along the northern coastline of Nova Scotia to Lismore and beyond. The eastward transport would be extended even further (at similar low concentrations) and confined to the shoreline under the most frequent December conditions (northwesterly winds). It should be noted that the TSS concentrations south of Pictou Island would remain low (less than 1 mg/L) in all scenarios, and particularly under the December conditions when the sediment plume is shifted away to the south compared to the calm conditions or under southwesterly winds.

Assuming that the 400 individual loads would be discharged over an area with a diameter of approximately 200 m, the sea bottom and benthos would be directly affected within this area where the main deposit would consist of sand and gravel. Effects of the plume outside of this area will be only for short periods of time (on the order of hours) and within a limited distance, as the TSS concentrations due to the dredged sediment disposal would be comparable to the background concentrations. Potential migration of the deposit in the long term would be at such low rates that it would not affect the benthos. Aside from the main sand and gravel deposit at the disposal site, there would be relatively little deposition of fine material, with silt and clay deposit thicknesses of the order of 1 millimetre (mm) found up to approximately 5 km in the southeast and northwest directions for the 2007 site, and approximately 4 km for the 1981 site. This far-field deposition pattern for the fine sediments is consistent with the overall direction of the tidal circulation near the coastline, and the lack of deposition is to be expected given that the natural sediment in the area is composed predominantly of sand.

The modeling results were interpreted in the context of the locations of the documented marine habitats from DFO Traditional Fisheries Map 4404 (shown in Figure 14 to Figure 16 in Appendix B), including scallop, lobster, rock crab, herring and mackerel habitats along the Nova Scotia coastline and surrounding Pictou Island to the northeast of Caribou harbour. Based on the estimates from the modeling analysis, the habitats are unlikely to be affected by the disposal operations. Overall the analysis for the different seasonal scenarios and disposal sites considered indicate that the zone of influence is not expected to be strongly dependent on the prevailing wind and wave direction, considering the most frequent seasonal conditions.

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Regarding the choice of the disposal site, the analysis indicates that the 2007 site would experience higher dispersion rates compared to the 1981 site, as the dominant tidal flow is expected to be higher there. The northeasterly wind scenario was considered as potentially the worst-case scenario due to its potential to shift the suspended plume toward Caribou Harbour, particularly from the 1981 site. However the analysis shows that even in that case the suspended sediment concentrations and fine sediment deposits are not expected to be significantly higher than for the 2007 site.

The results and conclusions in the present analysis are based on the assumption that the sediment disposal would be conducted using a relatively small vessel (50 m^3 sediment capacity per load), on a relatively fast operational schedule that continues for 24 hours per day over approximately 33 days. It should be noted that the modeling estimates, and particularly the far-field suspended sediment concentrations, are expected to be sensitive to the length of the disposal program, the capacity of the vessel, as well as the interval at which the vessel returns to the disposal site. All other parameters being equal, if the disposal operations were to follow a 12 hour, or a 16 hour schedule (followed by 12 hours off, or 8 hours off, respectively), the program would last proportionately longer and the average suspended sediment plume concentrations would be expected to be lower, yielding a relatively more benign impact. On the other hand, a shorter dredging program (due to shorter discharge interval between loads, or using a larger vessel) would be expected to produce relatively higher suspended sediment concentrations over the duration of the disposal operations.

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Closure

This letter was prepared exclusively for Public Works and Government Services Canada and for Transport Canada by AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC). The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC's services and based on: i) information available at the time of preparation, ii) data supplied by outside sources and iii) the assumptions, conditions and qualifications set forth in this letter. This letter is for use by Public Works and Government Services Canada and Transport Canada only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

We trust that the information contained herein is satisfactory for your present requirements. Should you have any questions or require further information, please contact the undersigned at your convenience.

Sincerely,

AMEC Environment & Infrastructure,
a division of AMEC Americas Limited

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Appendix A : Marine Sediment Sampling Program Grid Locations

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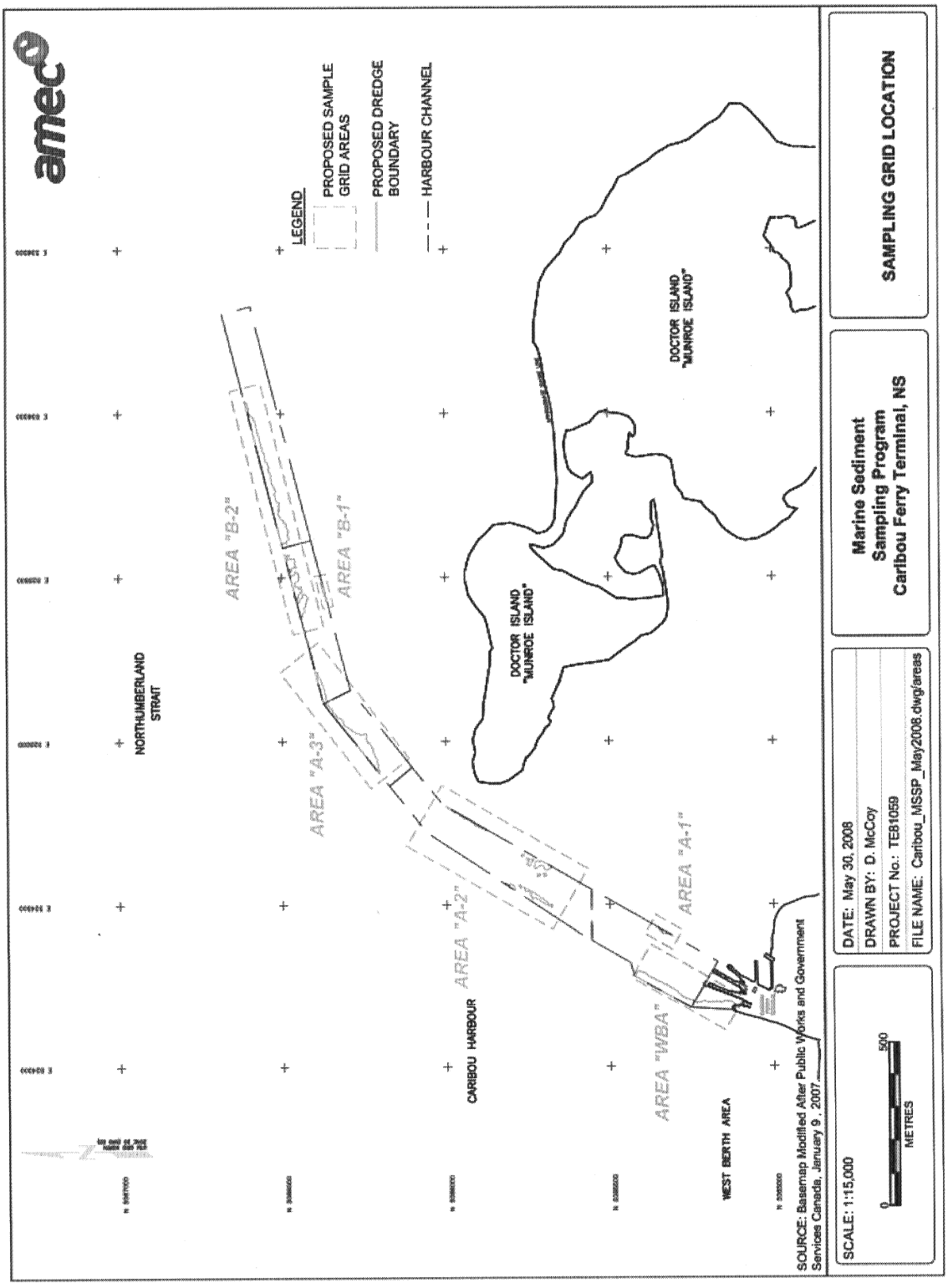


Figure 7 Marine sediment sampling program grid locations (AMEC, 2008)

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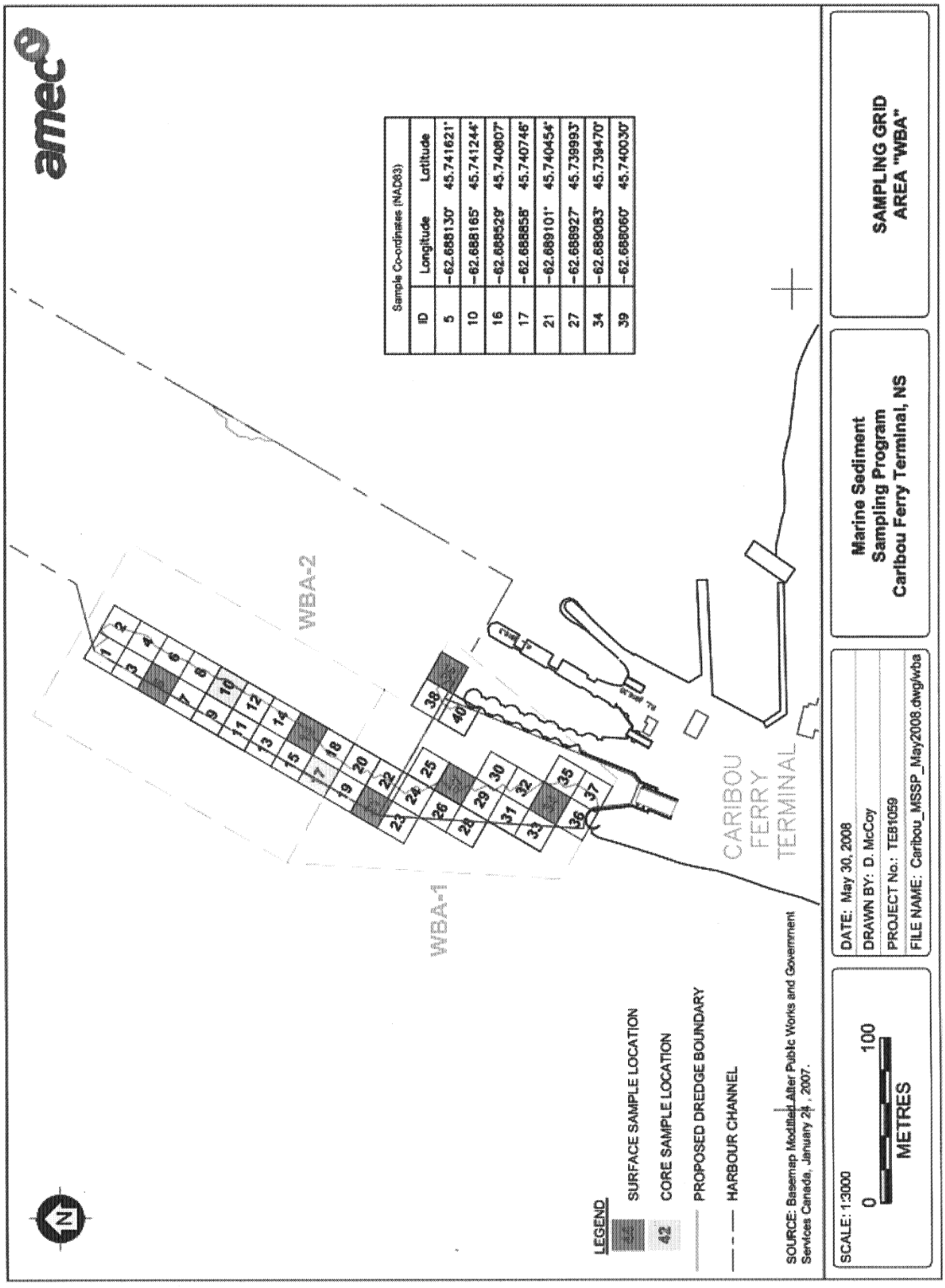


Figure 8 **Marine sediment sampling locations, area WBA (AMEC, 2008)**

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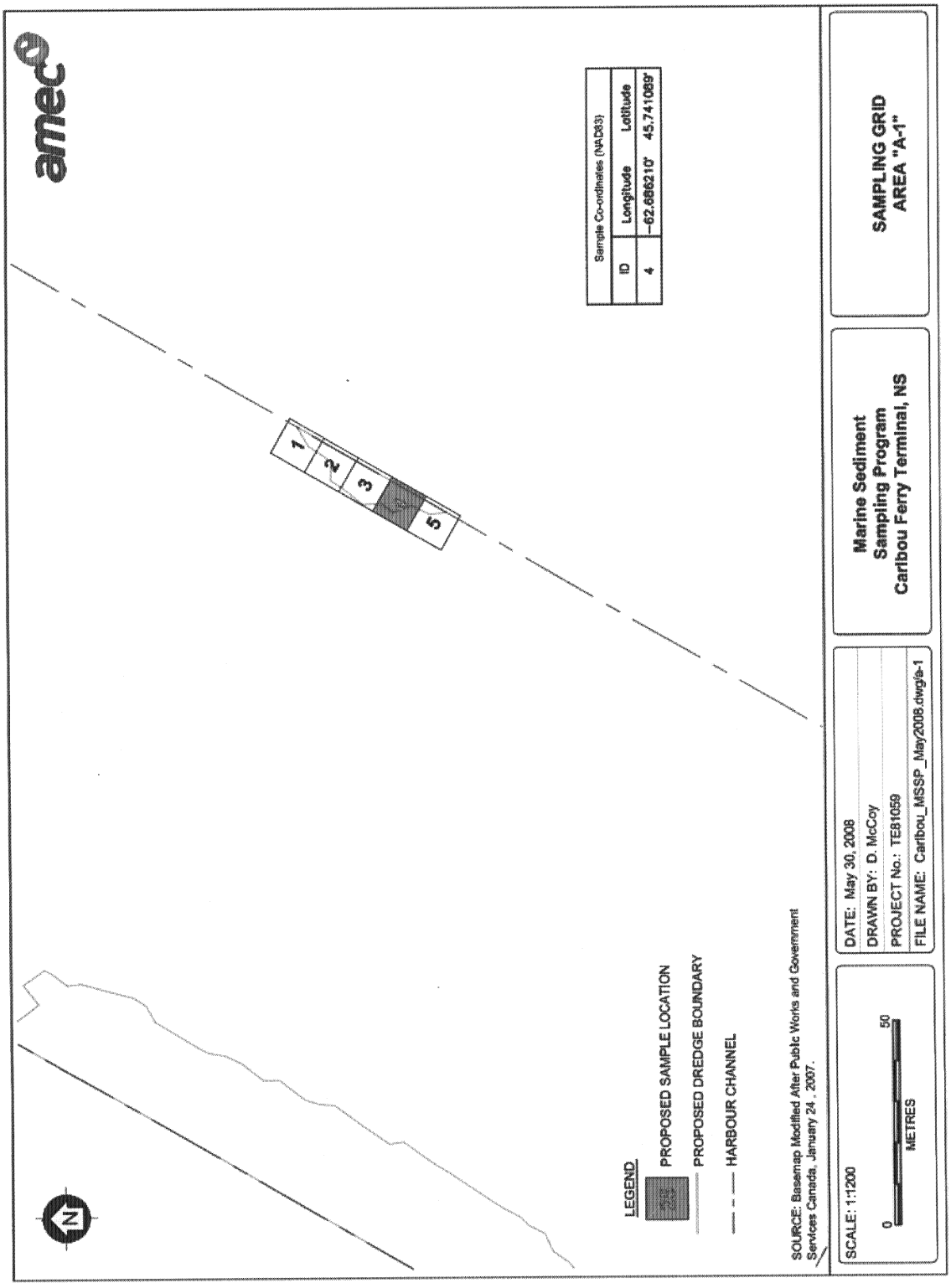


Figure 9 **Marine sediment sampling locations, area A-1 (AMEC, 2008)**

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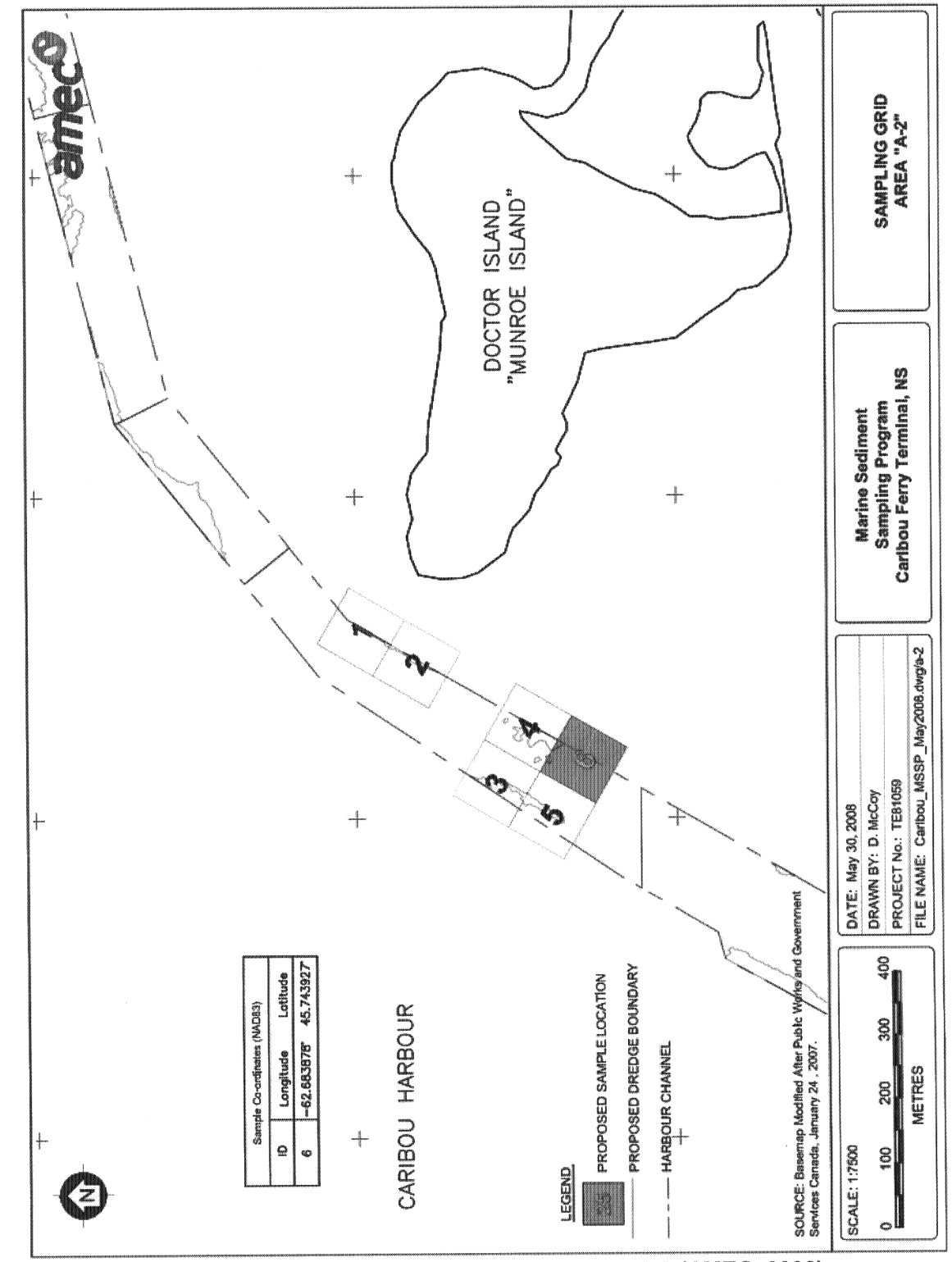


Figure 10 **Marine sediment sampling locations, area A-2 (AMEC, 2008)**

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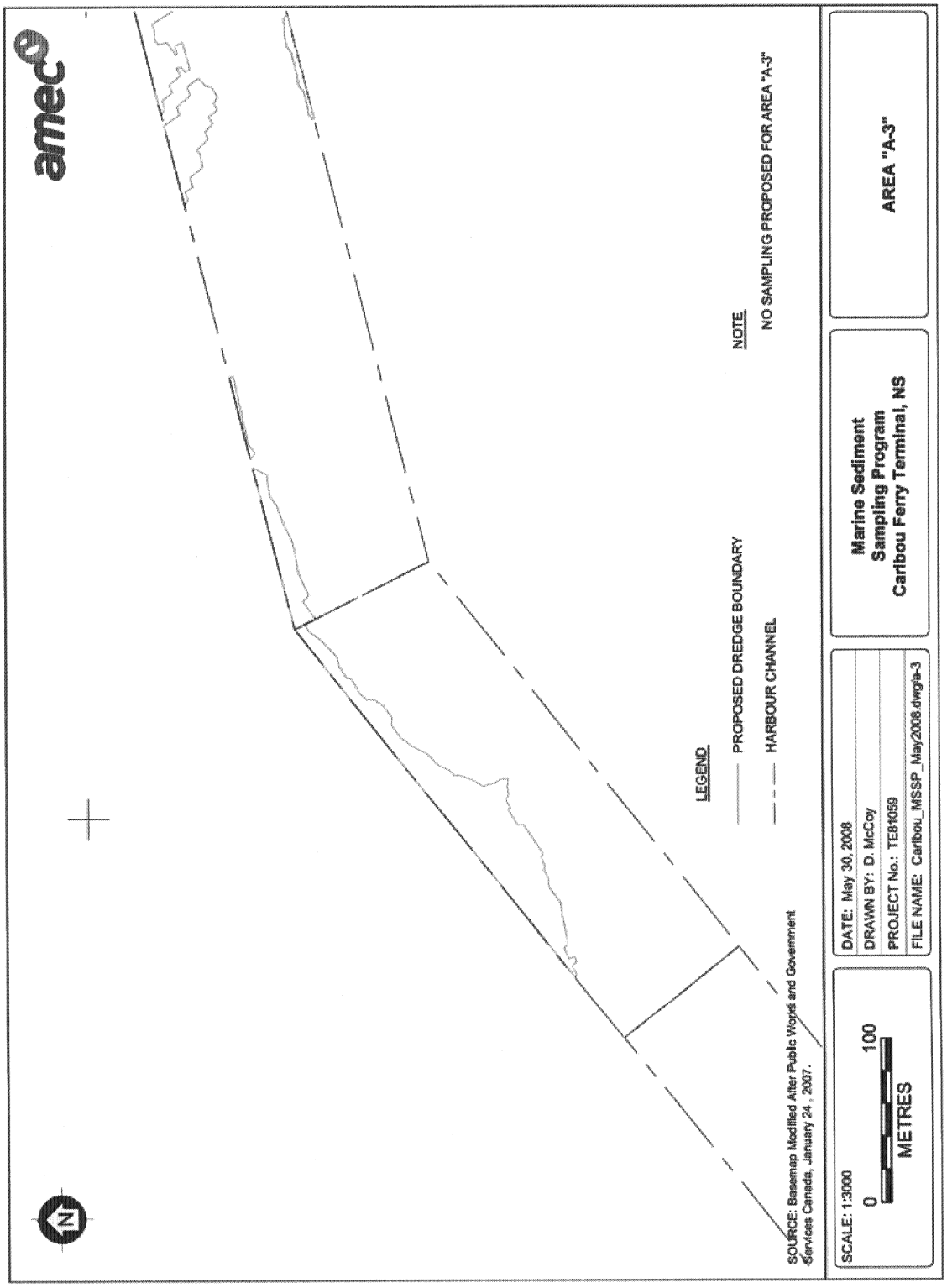


Figure 11 **Marine sediment sampling locations, area A-3 (AMEC, 2008)**

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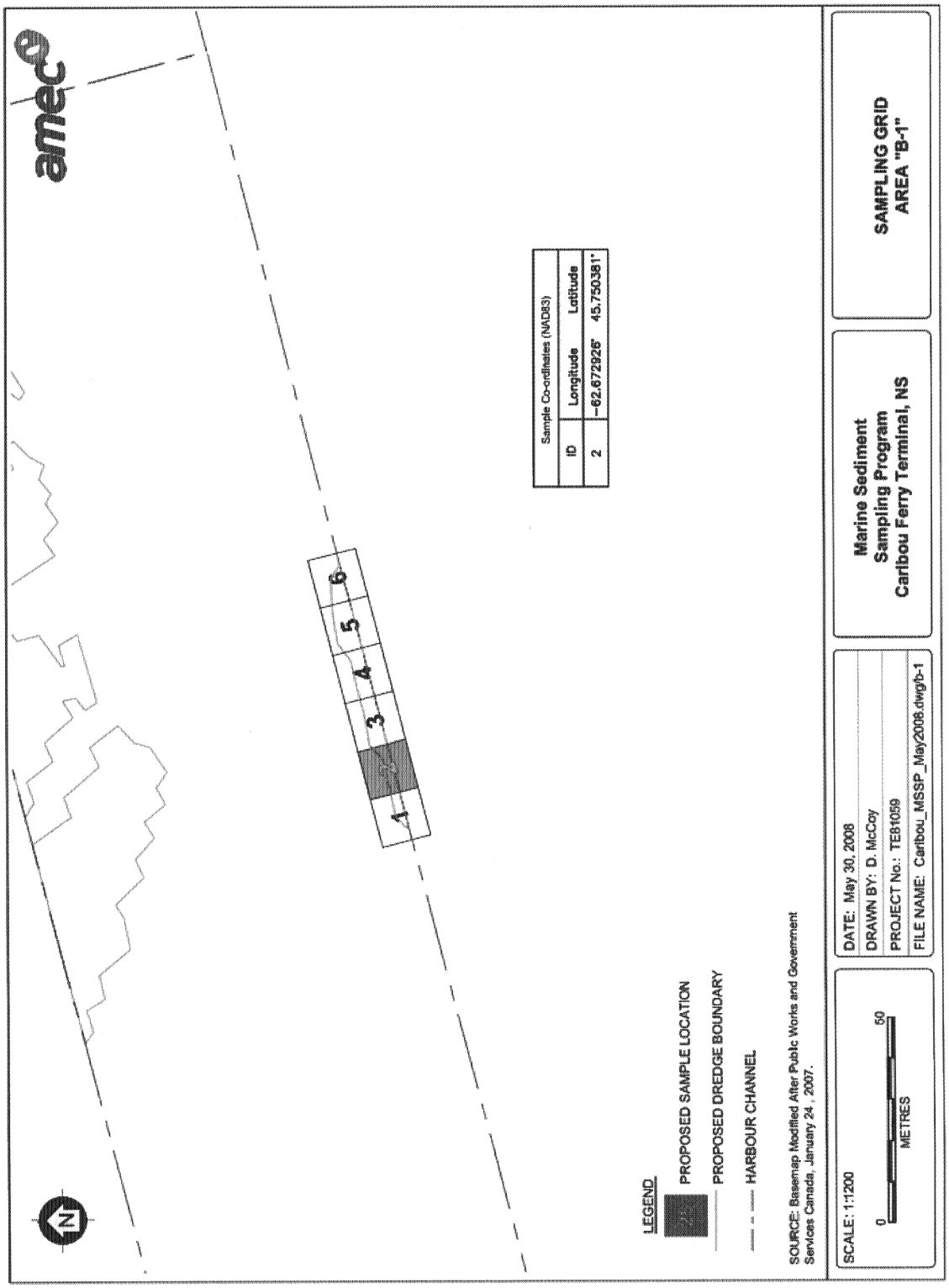


Figure 12 Marine sediment sampling locations, area B-1 (AMEC, 2008)

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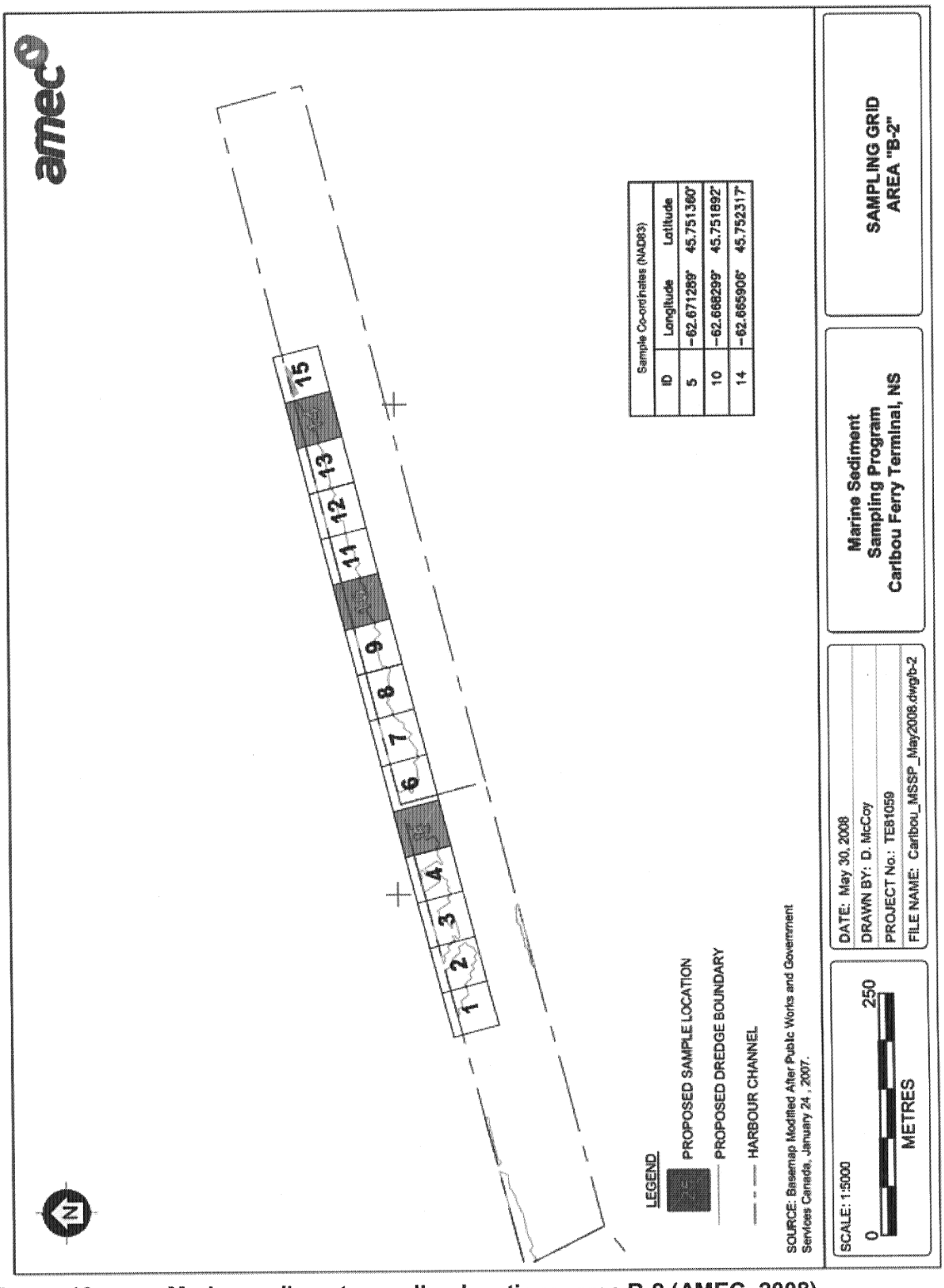


Figure 13 **Marine sediment sampling locations, area B-2 (AMEC, 2008)**

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Appendix B : Traditional Fisheries Maps, Department of Fisheries and Oceans Canada

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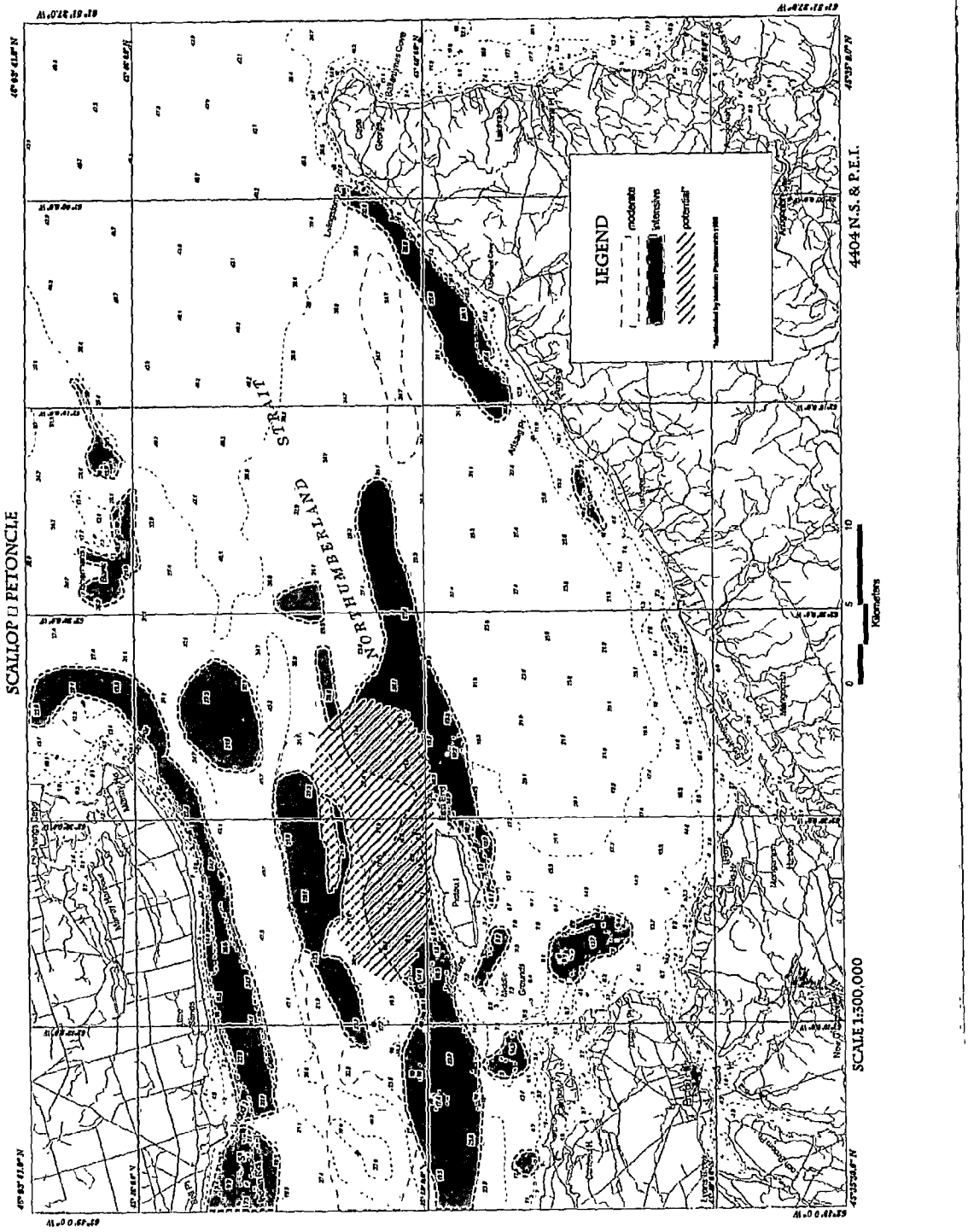


Figure 14 Traditional scallop fisheries map (DFO).

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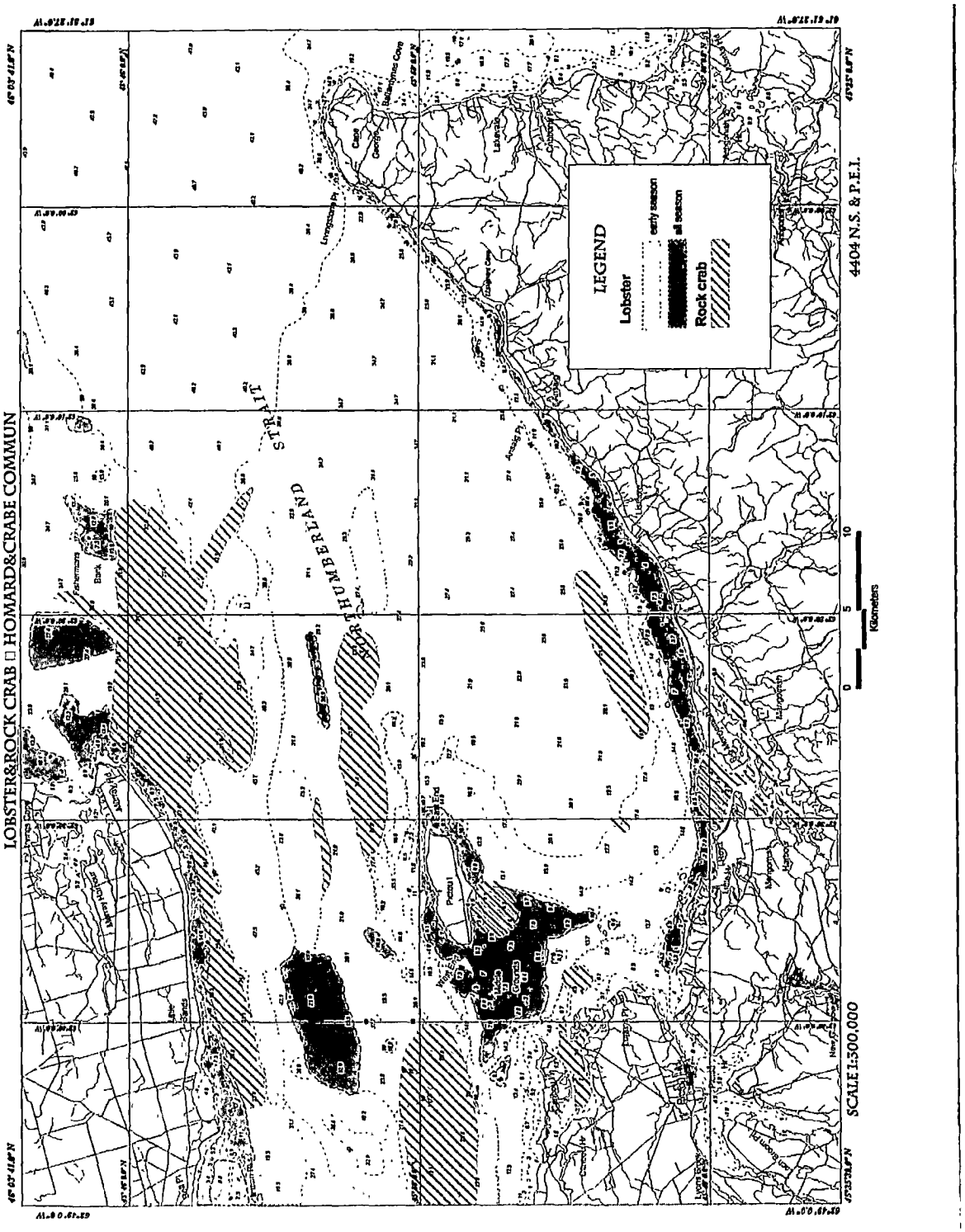


Figure 15 Traditional lobster and rock crab fisheries map (DFO).

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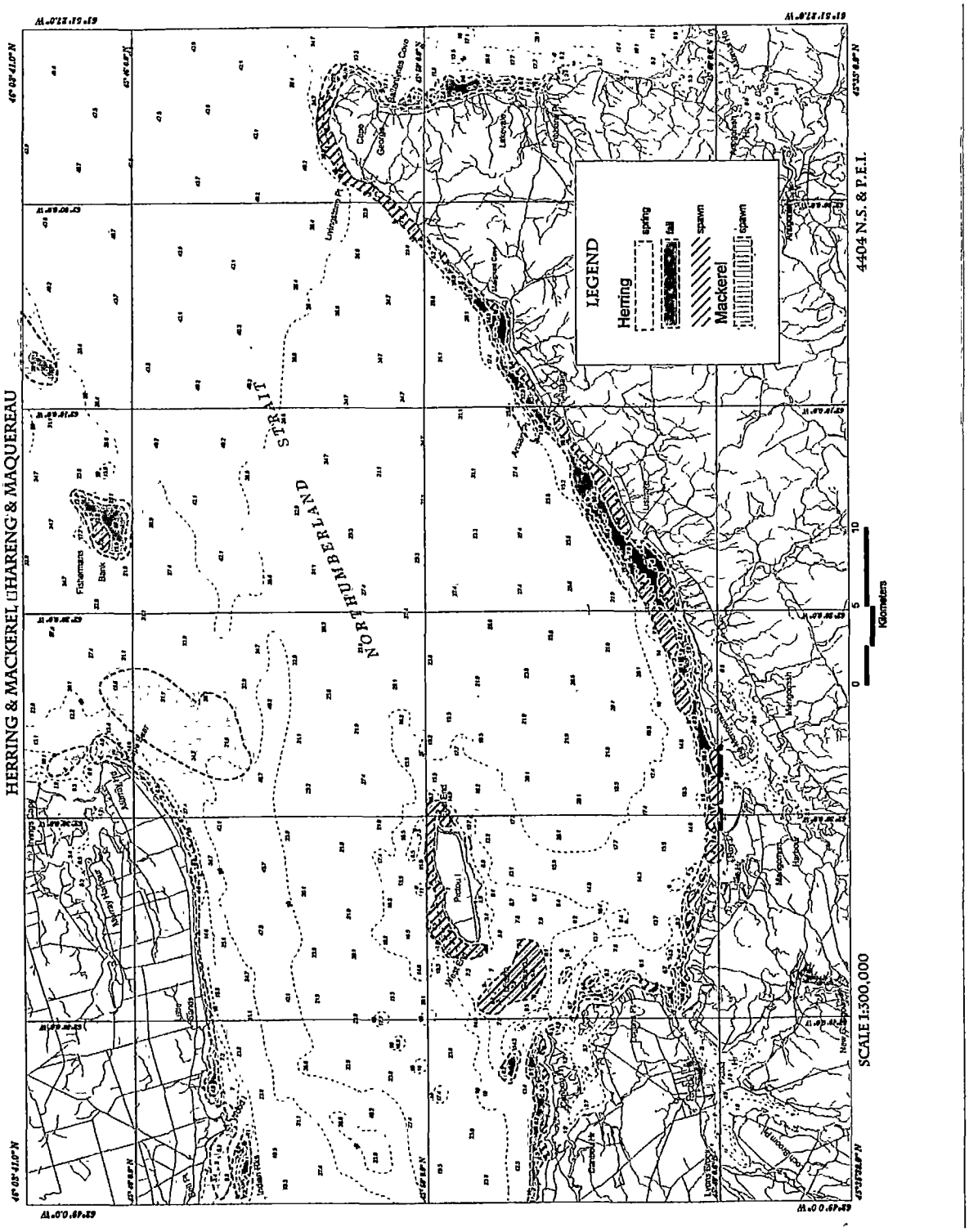


Figure 16 Traditional herring and mackerel fisheries map (DFO).

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amec foster wheeler

PWGSC PROJECT #R.071769.004
MARINE SEDIMENT SAMPLING PROGRAM
Transport Canada Ferry Terminal
Caribou, Nova Scotia

FINAL REPORT

Submitted to:
Public Works and Government Services Canada
Halifax, Nova Scotia

Submitted by:
Amec Foster Wheeler Environment & Infrastructure,
a Division of Amec Foster Wheeler Americas Limited
Dartmouth, Nova Scotia

February 2015

TV141220

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27 February 2015

TV141220

Mr. Troy Young, B.Sc.
Environmental Specialist
Environmental Services
Public Works and Government Services Canada
1713 Bedford Row
Halifax, Nova Scotia
B3J 3C9

Dear Mr. Young:

Re: Marine Sediment Sampling Program at the Transport Canada Ferry Terminal in Caribou, Nova Scotia – Final Report

Amec Foster Wheeler Environment & Infrastructure, a Division of Amec Foster Wheeler Americas Limited (Amec Foster Wheeler), is pleased to provide Public Works and Government Services Canada the findings of a Marine Sediment Sampling Program undertaken at the Transport Canada Ferry Terminal in Caribou, Nova Scotia.

Amec Foster Wheeler appreciates the opportunity to provide services to your organization. Please do not hesitate to call if you have any questions regarding this, or any other matter.

Respectfully submitted,

Senior Environmental Scientist
Direct Tel.:
Direct Fax:
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EXECUTIVE SUMMARY

The Marine Sediment Sampling Program completed at the Transport Canada Ferry Terminal in Caribou, Nova Scotia was comprised of the collection of three (3) marine sediment samples within the Outer Channel area and six (6) marine sediment samples in each of the Inner Channel and Berth areas on 15 December 2014. The samples were submitted to AGAT Laboratories (AGAT) for detailed analyses. Results were compared to the *Canadian Environmental Protection Act* (CEPA) Disposal at Sea Lower Level Screening Criteria; Canadian Council of Ministers of the Environment (CCME) Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health (1999a); Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 3.0 Risk-Based Screening Levels (RBSLs) and Sediment Ecological Screening Levels (SESLs) for the Protection of Freshwater and Marine Aquatic Life (2012); Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992); and Nova Scotia Tier 1 Environmental Quality Standards (EQS) (2013), where applicable. Tables ES1 and ES2, below, report the summarized guideline exceedance results of the sediment analysis for the field program. Figures ES1, ES2, and ES3 (below) depict the summarized substrate composition for the samples collected from the Caribou Ferry Terminal sample locations.

Table ES1 Sediment Analysis Guideline Exceedance Table – Inner Channel Samples

Guideline / Parameter	Sample ID					
	Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
CEPA Disposal at Sea – Lower Level Screening Criteria						
PAHs	-	-	-	-	-	-
Metals	-	-	-	-	-	-
PCBs	-	-	-	-	-	-
CCME SQGs						
PAHs	-	-	-	-	-	-
Metals	-	-	-	-	-	-
PCBs	-	-	-	-	-	-
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills						
PAHs	-	-	-	-	-	-
Metals	●	●	●	●	●	●
PCBs	-	-	-	-	-	-
Nova Scotia Tier 1 EQS						
PAHs	-	-	-	-	-	-
Metals	-	●	-	-	●	●
PCBs	-	-	-	-	-	-

Notes:
"-" indicates no exceedance
"●" indicates exceedance
1 – PAH - polycyclic aromatic hydrocarbon
2 – PCB - polychlorinated biphenyl

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Table ES2 Sediment Analysis Guideline Exceedance Table – Berth Samples

Guideline / Parameter	Sample ID					
	Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
CEPA Disposal at Sea – Lower Level Screening Criteria						
PAHs	-	-	-	-	-	-
Metals	-	-	-	-	-	-
PCBs	-	-	-	-	-	-
CCME SQGs						
PAHs	-	-	-	-	-	-
Metals	-	●	-	-	●	●
BTEX[1]	-	-	-	-	-	-
PCBs	-	-	-	-	-	-
DDT[2]	-	-	-	-	-	-
Atlantic RBCA Tier 1 Version 3.0 RBSLs and SESLs						
BTEX	-	-	-	-	-	-
TPH[3]	-	-	-	-	-	-
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills						
PAHs	-	-	-	-	-	-
Metals	●	●	●	●	●	●
BTEX	-	-	-	-	-	-
PCBs	-	-	-	-	-	-
Nova Scotia Tier 1 EQS						
PAHs	-	-	-	-	-	-
Metals	●	●	●	-	●	●
BTEX	-	-	-	-	-	-
TPH	-	-	-	-	-	-
PCBs	-	-	-	-	-	-

Notes:
"-" indicates no exceedance
"●" indicates exceedance
1 – BTEX - benzene, toluene, ethylbenzene, and xylene
2 – DDT - dichloro-diphenyl-trichloroethane
3 – TPH - total petroleum hydrocarbons

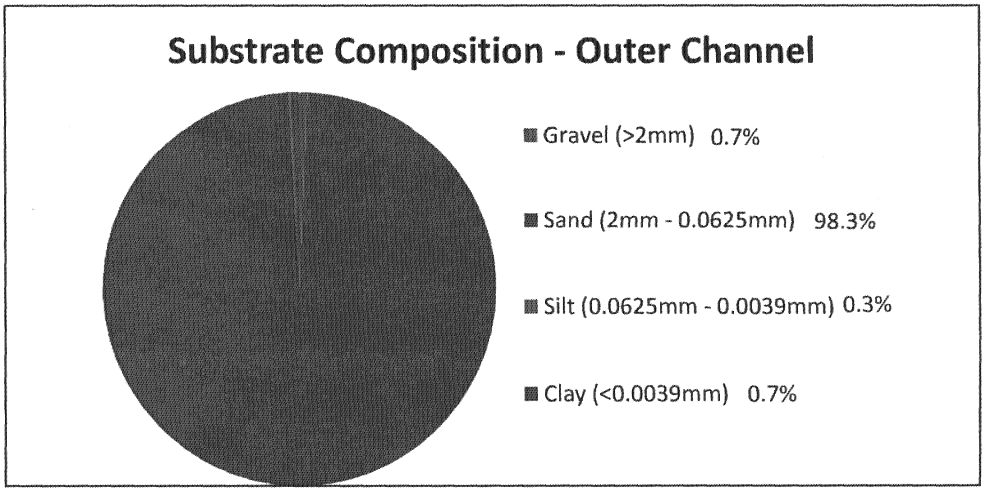


Figure ES1 Substrate Composition Averaged from Sampling Locations within the Outer Channel at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

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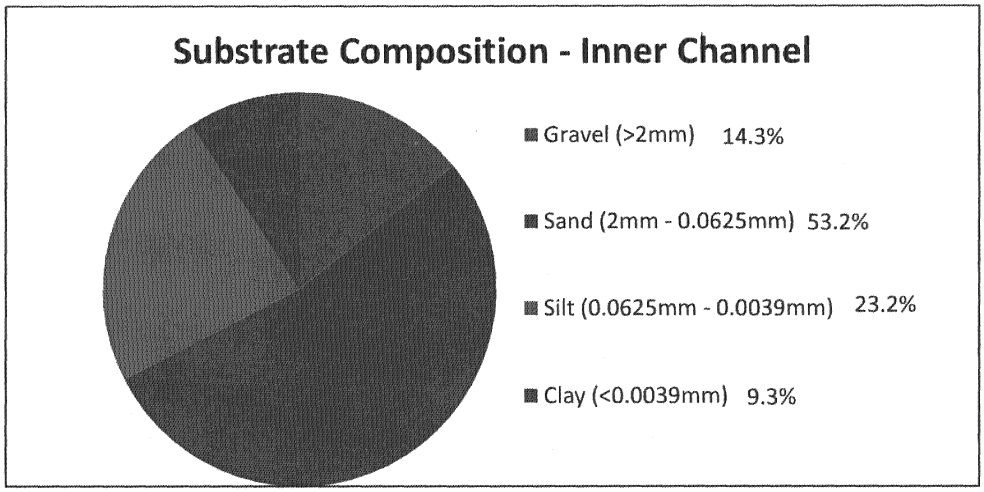


Figure ES2 Substrate Composition Averaged from Sampling Locations within the Inner Channel at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

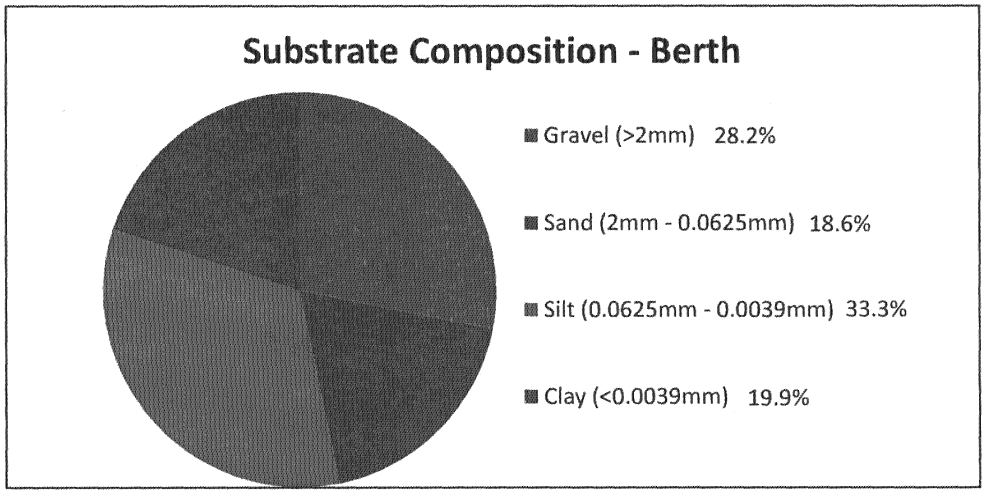


Figure ES3 Substrate Composition Averaged from Sampling Locations within the Berth at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

Based on the results of the sediment analysis, five (5) of the Berth samples were submitted for select Synthetic Precipitation Leaching Procedure (SPLP) leachate analysis. Results from these samples were compared to the CCME Canadian Water Quality Guidelines (WQGs) for the Protection of Aquatic Life (1999b); Health Canada Canadian Guidelines for Drinking Water Quality (CGDWQ) (2014); Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992); and Nova Scotia Tier 1 EQS (2013). Table ES3, below, reports the summarized guideline exceedance results for the leachate analyses completed on select sediment samples.

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Table ES3 Leachate Analysis Guideline Exceedance Table

Guideline / Parameter	Sample ID				
	Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-6	Car-2014-3-8
CCME WQGs for the Protection of Aquatic Life					
Metals	•	•	•	•	•
Health Canada CGDWQ					
Metals	•	•	•	•	•
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills					
Metals	-	-	-	-	-
Nova Scotia Tier 1 EQS					
Metals	•	•	•	•	•

Notes
"•" indicates exceedance
"-"indicates no exceedance

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1.0 INTRODUCTION

At the request of Public Works and Government Services Canada (PWGSC), fifteen (15) marine sediment samples were collected at select stations within the Berth (6), Inner Channel (6), and Outer Channel (3) locations of the Transport Canada Ferry Terminal in Caribou, Nova Scotia on 15 December 2014 (Figure 1.1).

2.0 SCOPE AND METHODOLOGY

2.1 Site Plan

The Marine Sediment Sampling Program (MSSP) followed instructions by Environment Canada in guidance provided to PWGSC dated 14 October 2014, whereby three (3) marine sediment samples were collected within the Outer Channel and six (6) marine sediment samples were collected within each of the Inner Channel and Berth areas of the Transport Canada Ferry Terminal in Caribou, Nova Scotia. The sample location coordinates provided by Environment Canada were used to georeference the sample stations.

A detailed program design was prepared by Amec Foster Wheeler and submitted to PWGSC on 20 November 2014 for review and approval prior to field program implementation.

Sample collection, preparation, and analyses were conducted in accordance with Environment Canada's publication *Guidance Document on Collection and Preparation of Sediments for Physicochemical Characterization and Biological Testing* (1994). Connors Diving Services Limited was retained to collect the sediment samples. The sample collection field program was completed in accordance with guidelines defined by provincial Occupational Health and Safety Standards.

2.2 Sample Collection and Analysis

The marine sediment samples were collected by divers at the selected sampling stations. A handheld Garmin Global Positioning System (GPS) was used to georeference the sampling location coordinates that were provided by Environment Canada prior to field program initiation. Once on station at the sample sites, the diver used laboratory-supplied jars to penetrate the substrate to a depth of 0 to 15 centimetres (cm) such that the upper 15 cm of the sediment column will be collected.

It is important to note that due to the large boulder substrate encountered at sample station Car-2014-3-4, a marine sediment sample was not able to be obtained from this location. Following discussion of this observation with PWGSC, two alternate sampling locations suggested by Environment Canada were used and labelled Car-2014-3-7 and Car-2014-3-8 (Figure 2.1). Only Car-2014-3-8 proved suitable for sample collection, therefore a sample was collected from this location and replaced Car-2014-3-4 for analysis. Sampling locations and coordinates for the inner and outer channel are included in Figure 2.2. Sample station coordinates for all sample locations are listed below in Table 2.1. Appendix A is comprised of a collection of photos taken of the sample locations during the field program.

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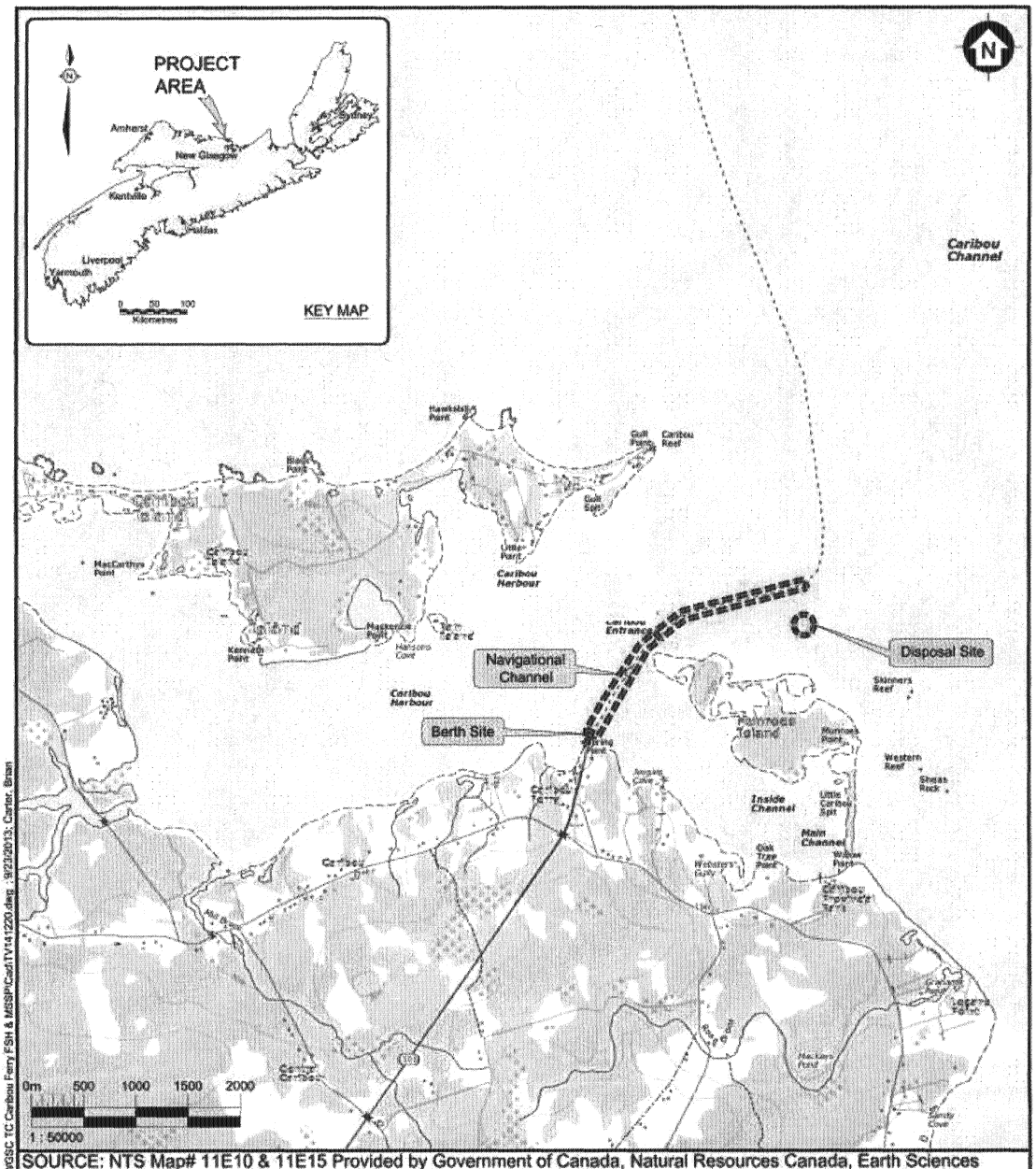
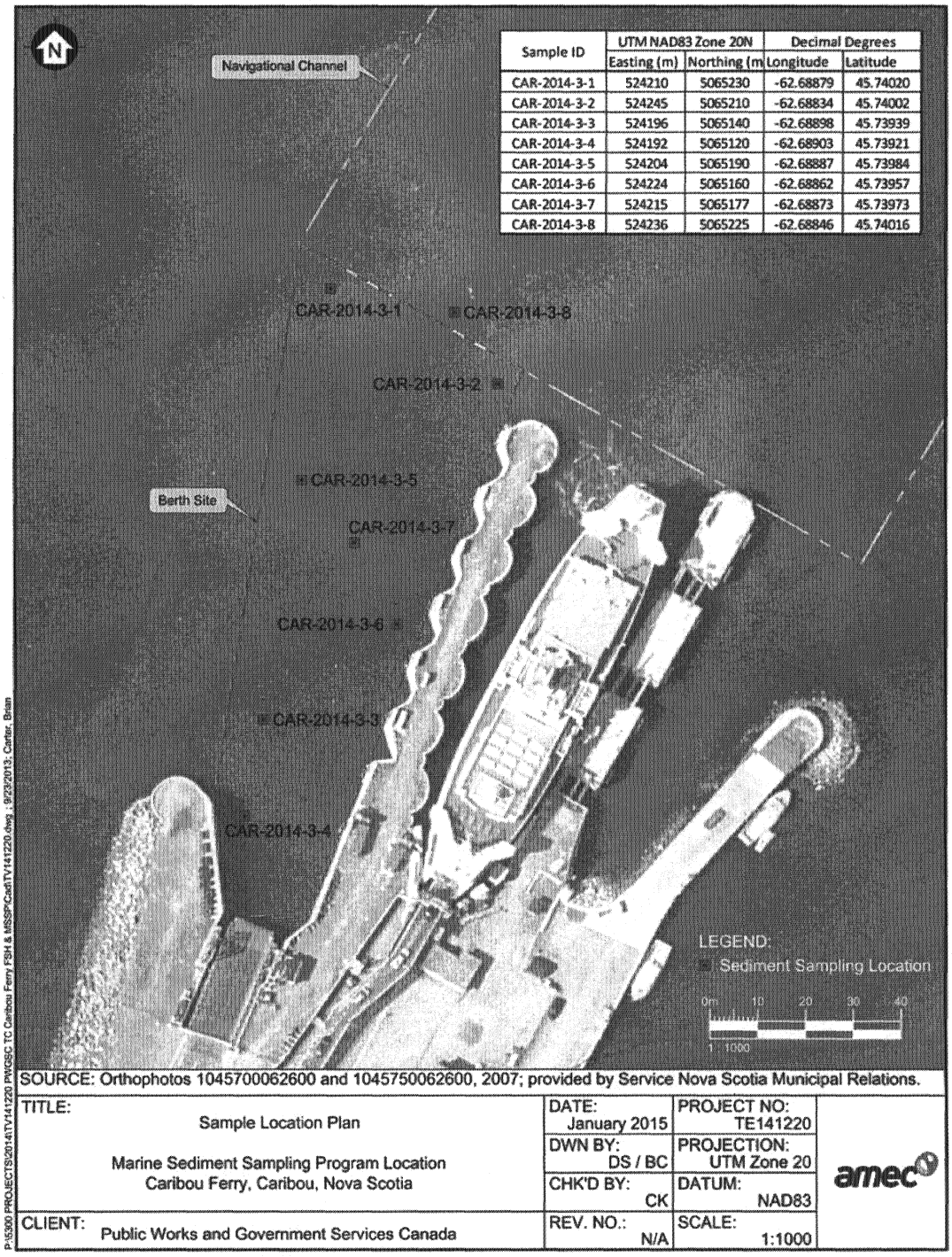


Figure 1.1 Project Sites at Transport Canada Ferry Terminal, Caribou, Nova Scotia (15 December 2014)

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Sample ID	UTM NAD83 Zone 20N		Decimal Degrees	
	Easting (m)	Northing (m	Longitude	Latitude
CAR-2014-3-1	524210	5065230	-62.68879	45.74020
CAR-2014-3-2	524245	5065210	-62.68834	45.74002
CAR-2014-3-3	524196	5065140	-62.68898	45.73939
CAR-2014-3-4	524192	5065120	-62.68903	45.73921
CAR-2014-3-5	524204	5065190	-62.68887	45.73984
CAR-2014-3-6	524224	5065160	-62.68862	45.73957
CAR-2014-3-7	524215	5065177	-62.68873	45.73973
CAR-2014-3-8	524236	5065225	-62.68846	45.74016

SOURCE: Orthophotos 1045700062600 and 1045750062600, 2007; provided by Service Nova Scotia Municipal Relations.

TITLE: Sample Location Plan Marine Sediment Sampling Program Location Caribou Ferry, Caribou, Nova Scotia	DATE: January 2015	PROJECT NO: TE141220	amec
	DWN BY: DS / BC	PROJECTION: UTM Zone 20	
	CHK'D BY: CK	DATUM: NAD83	
CLIENT: Public Works and Government Services Canada	REV. NO.: N/A	SCALE: 1:1000	

P:\15300 PROJECTS\2014\TV141220 PINGSC TC Caribou Ferry FSH & MSSP\Cad\TV141220.dwg ; 9/23/2013; Carter, Brian

Figure 2.1 Marine Sediment Sample Station Locations within the Berth Area of the Transport Canada Ferry Terminal, Caribou, Nova Scotia (15 December 2014)

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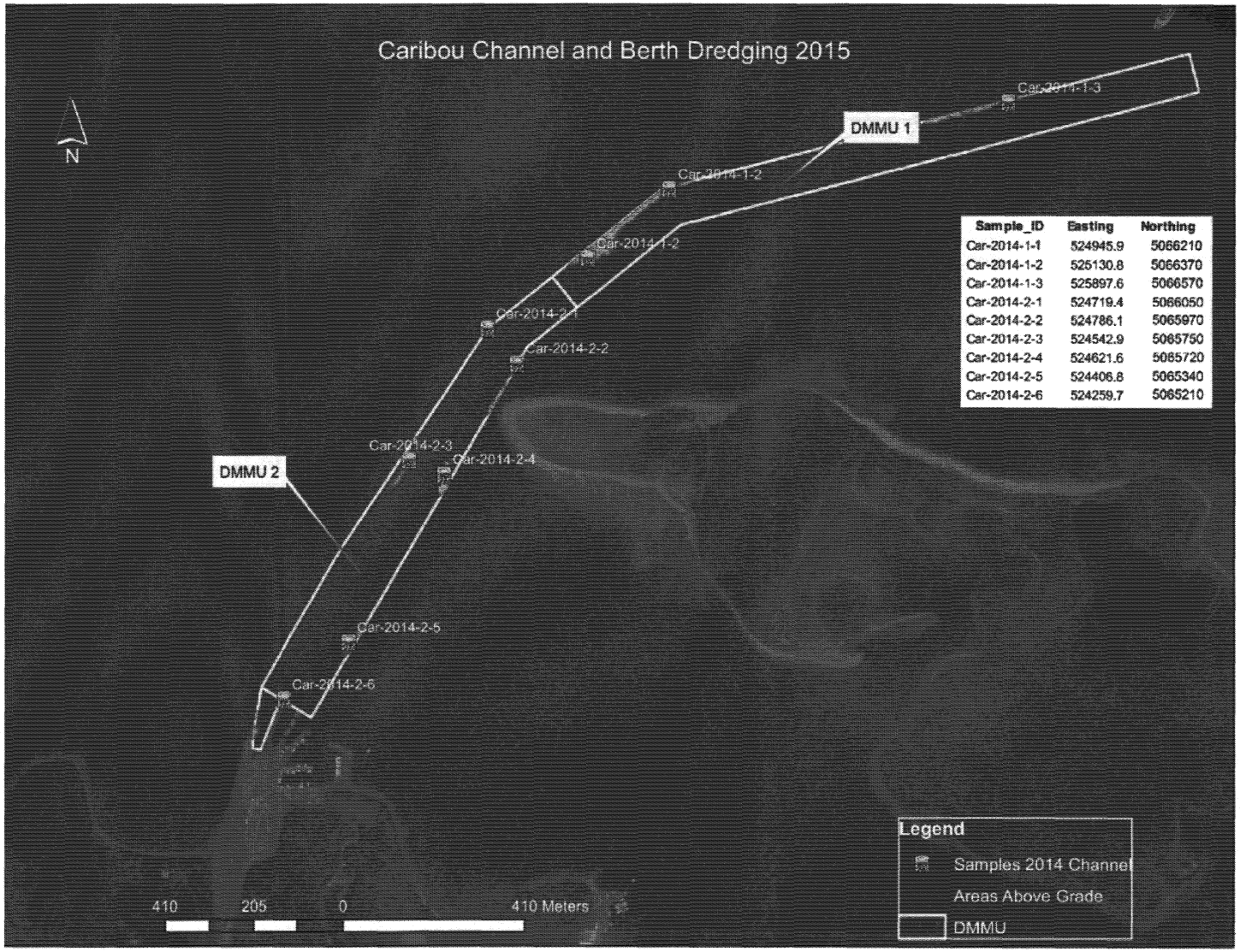


Figure 2.2 Marine Sediment Sample Station Locations within the Channel Area of the Transport Canada Ferry Terminal, Caribou, Nova Scotia (15 December 2014)

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Table 2.1 Sample Coordinates

Sample ID	Sample Station Coordinates (UTM, NAD 83)	
	Easting	Northing
Outer Channel		
Car-2014-1-1	524946	5066210
Car-2014-1-2	525131	5066370
Car-2014-1-3	525898	5066570
Inner Channel		
Car-2014-2-1	524719	5066050
Car-2014-2-2	524786	5065970
Car-2014-2-3	524543	5065750
Car-2014-2-4	524622	5065720
Car-2014-2-5	524407	5065340
Car-2014-2-6	524260	5065210
Berth		
Car-2014-3-1	524210	5065230
Car-2014-3-2	524245	5065210
Car-2014-3-3	524196	5065140
Car-2014-3-4*	524192	5065120
Car-2014-3-5	524204	5065190
Car-2014-3-6	524224	5065160
Car-2014-3-7*	524215	5065177
Car-2014-3-8	524236	5065225

Note:
* No sample collected at this station due to unsuitable sample substrate.

Duplicate samples were collected from all stations to safeguard against loss or damage during transport. All samples were then stored in the laboratory-supplied jars and kept in a cooler on until the field program was completed. Upon completion of the field program, the samples were chilled and delivered to the laboratory for select chemical analyses. The duplicate sediment samples were refrigerated and stored at the Amec Foster Wheeler office in Dartmouth, Nova Scotia.

AGAT Laboratories (AGAT) in Dartmouth, Nova Scotia, an accredited laboratory with the Canadian Association for Laboratory Accreditation (CALA) and ISO/IEC 17025 certified for all of the analyses required for this Project, was engaged to conduct the laboratory analyses. Under the guidance of Environment Canada, the marine sediment samples collected within the Outer Channel were submitted for grain size and total organic carbon (TOC) only, while the samples collected within the Inner Channel area were submitted for the Disposal at Sea (DAS) suite of parameters which includes a metals scan (including cadmium, copper, lead, mercury, and zinc); total polycyclic aromatic hydrocarbons (PAHs); total polychlorinated biphenyls (PCBs); grain size; and TOC. The marine sediment samples collected within the Berth area were submitted for both the typical DAS and land disposal suite of parameters which includes a metals scan plus mercury, hexavalent chromium, tin, low-level selenium, and hot water soluble boron; low level PAHs; total inorganic carbon (TIC) and TOC; total PCBs; total dichloro-diphenyl-trichloroethane (DDT); low level benzene, toluene, ethylbenzene, and xylene (BTEX); total petroleum hydrocarbons (TPHs), including a qualitative assessment for presence/absence of creosote; and grain size. Silica gel

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clean-up will be completed for all samples analyzed for petroleum hydrocarbons and a return to baseline at C32 will be verified.

The requirement for Synthetic Precipitation Leaching Procedure (SPLP) Leachate (Environmental Protection Agency (EPA), *Methodology 1312*) was determined in conjunction with PWGSC upon receipt and review of initial sample results (EPA, 1994). This analysis was performed for select samples with parameters exceeding applicable guidelines.

3.0 ANALYTICAL RESULTS

The analytical results of the marine sediment samples from the Outer Channel are summarized in Table B1.1; while the results of the samples from the Inner Channel are summarized in Tables B2.1 to B2.7; and the results of the samples from the Berth are summarized in Tables B3.1 to B3.10 (Appendix B) and discussed below. The complete set of analytical results, including laboratory Quality Assurance/Quality Control (QA/QC) and Certificates of Analyses for all parameters tested, are provided in Appendix C.

In order to facilitate the determination of all disposal options, the tabulated analytical sample results were compared to the following, where applicable:

- *Canadian Environmental Protection Act* (CEPA) Disposal at Sea Regulations (formerly the *Ocean Dumping Control Act*) – Lower Level Screening Criteria.
- Canadian Council of Ministers of the Environment (CCME) Sediment Quality Guidelines - Interim Sediment Quality Guidelines (ISQGs) and Marine and Estuarine Probable Effects Levels (PELs) (1999c).
- CCME Soil Quality Guidelines (SQGs) for the Protection of Environment and Human Health in agricultural, residential/parkland, and commercial/industrial applications (1999a).
- Atlantic Risk-Based Corrective Action (RBCA) Tier 1 Version 3.0 Risk-Based Screening Levels (RBSLs) and Sediment Ecological Screening Levels (SESLs) for the Protection of Freshwater and Marine Aquatic Life (2012).
- Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992).
- Nova Scotia Tier 1 Environmental Quality Standards (EQS) (2013).
- CCME Water Quality Guidelines (WQGs) (1999b).
- Health Canada's Canadian Guidelines for Drinking Water Quality (CGDWQ) (2014).

Results as compared to the afore-noted guidelines, with the exception of the CCME Sediment Quality Guidelines (ISQGs and PELs), are discussed further in this report.

3.1 PAH Concentrations

CEPA Disposal at Sea Screening Criteria - Lower Level

PAHs were not detected in any of the samples from the Inner Channel and Berth areas and no exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria were noted (Tables B2.1 and B3.1).

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CCME SQGs - Human Health and Environmental Health
PAHs were not detected in any of the samples analyzed for PAHs from the Inner Channel and Berth areas and no exceedances of the CCME SQGs for Human and Environmental Health were noted (Tables B2.1 and B3.1).

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)
PAHs were not detected in any of the samples analyzed for PAHs from the Inner Channel and Berth areas and no exceedances of the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills were noted (Tables B2.2 and B3.2).

Nova Scotia Tier 1 EQS
PAHs were not detected in any of the samples analyzed for PAHs from the Inner Channel and Berth areas and no exceedances of the Nova Scotia Tier 1 EQS were noted (Tables B2.2 and B3.2).

3.2 Metal Concentrations

CEPA Disposal at Sea Screening Criteria - Lower Level
None of the samples analyzed for metals from the Inner Channel and Berth areas exceeded the CEPA Disposal at Sea Lower Level Screening Criteria (Tables B2.3 and B3.3) for metals.

CCME SQGs
One sample collected from the Inner Channel (Car-2014-2-2) and three samples collected from the berth (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the CCME SQGs for agricultural land use applications for molybdenum (Tables B2.3 and B3.3).

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)
All samples analyzed for metals from the Inner Channel and Berth areas exceeded the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills for boron (Tables B2.4 and B3.4).

Nova Scotia Tier 1 EQS
Four samples collected from the Berth (Car-2014-3-1, Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the Nova Scotia Tier 1 EQS for agricultural land use applications for hot water soluble boron. The Nova Scotia Tier 1 EQS for agricultural, residential/parkland, and commercial land use applications were exceeded by one sample collected from the Inner Channel (Car-2014-2-2) and three samples collected from the Berth (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) for aluminium. These guidelines were also exceeded three samples collected from the Inner Channel (Car-2014-2-2, Car-2014-2-5, and Car-2014-2-6) and five samples collected from the Berth (Car-2014-3-1, Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) for iron (Tables B2.4 and B3.4).

SPLP Metals Leachate Results

Five samples (Car-2014-3-1, Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) were submitted for SPLP metals leachate analysis based on noted guideline exceedances and discussions with PWGSC.

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CCME WQGs for the Protection of Aquatic Life (Freshwater and Marine)

All five samples exceeded the CCME WQGs for the Protection of Aquatic Life (Freshwater) for selenium, and all but one sample (Car-2014-3-1) exceeded the guideline for aluminium. Three samples (Car-2014-3-2, Car-2014-3-3, and Car-2014-3-8) exceeded the CCME WQG for the Protection of Aquatic Life (Freshwater) for boron, and Car-2014-3-6 exceeded for iron. For four of the five samples (Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8), the pH was outside of the CCME WQG range for the Protection of Aquatic Life (Freshwater and Marine) (Table B3.5).

Health Canada CGDWQ (Maximum Acceptable Concentration and Aesthetic Objective)

No exceedances of the Health Canada CGDWQ (Maximum Acceptable Concentration) were noted in the five leachate samples. Four of the five samples (Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded the CGDWQ (Aesthetic Objective) for pH, while four samples (Car-2014-3-1, Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the Aesthetic Objective for sodium. Three of the five samples (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the Aesthetic Objective for molybdenum and sample Car-2014-3-6 exceeded for iron (Table B3.5).

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)

No exceedances of the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992) were noted in the five leachate samples (Table B3.5).

Nova Scotia Tier 1 EQS

The Nova Scotia Tier 1 EQS for Surface Water (Freshwater and Marine) were exceeded by all five samples for selenium, and by three of five samples for boron (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) and copper (Car-2014-3-1, Car-2014-3-2, and Car-2014-3-3). The Nova Scotia Tier 1 EQS for Surface Water (Freshwater) was exceeded by one sample for cadmium (Car-2014-3-1) and lead (Car-2014-3-6). The Nova Scotia Tier 1 EQS for Groundwater at potable sites was exceeded in four of five samples (Car-2014-3-1, Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) for sodium, and in three samples (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) for selenium (Table B3.5).

3.3 Petroleum Hydrocarbon Concentrations

Modified TPH values reflect the sum of the individual carbon fractions that resembles gasoline, diesel #2, and lube oil. Neither BTEX nor TPH were detected any of the six samples collected from the Berth area and all six samples reached baseline at C_{32} (Table C3.6 and C3.7).

No exceedances of the Atlantic RBCA Tier 1 Version 3.0 RBSLs and SESLs for the Protection of Freshwater and Marine Aquatic Life, CCME SQGs, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted in any of the six samples collected from the Berth area (Tables B3.6 and B3.7).

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3.4 PCBs Concentrations

PCBs were not detected in any of the samples analyzed for PCBs from the Inner Channel and Berth areas and no exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria, CCME SQGs for all land use applications, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted (Tables B2.5, B2.6, B3.8, and B3.9).

3.5 DDT Concentrations

Total DDT refers to the sum of dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyldichloroethane (DDD), and DDT. Neither DDE, DDD, or DDT were detected in any of the six samples collected from the Berth area and no exceedances of the CEPA Disposal at Sea Lower Level Screening Criteria, CCME SQGs for all land use applications, Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills, or Nova Scotia Tier 1 EQS were noted (Tables B3.8 and B3.9).

3.6 Carbon Content

The three samples collected from the Outer Channel area displayed levels of TOC as below the detection limit of 0.15 grams per kilogram (g/kg) in samples Car-2014-1-1 and Car-2014-1-3, while sample Car-2014-1-2 had a TOC concentration of 0.35 g/kg (Table C1.1). The six samples collected from the Inner Channel area showed TOC concentration ranging from 0.17 g/kg in sample Car-2014-2-1 to 9.85 g/kg in sample Car-2014-2-2 (Table B2.7).

The samples collected from the Berth area displayed levels of TIC below the detection level of 0.15g/kg in all of the six samples collected (at a value of 0.15 g/kg), while TOC ranged from 0.55 g/kg in sample Car-2014-3-3 to 10.3 g/kg in sample Car-2014-3-6 (Table B3.10).

3.7 Grain Size Distribution

Sediment composition is described in Figures 3.1 to 3.3 and Table 3.1 below for the Outer Channel, Inner Channel, and Berth areas of the Transport Canada Ferry Terminal in Caribou, Nova Scotia. Figures 3.1 to 3.3 illustrate the overall sediment composition from the samples collected from each area, expressed as percentages to show the average grain size distributions. Table 3.1 breaks down the sediment composition at each sampling location within each of the three areas.

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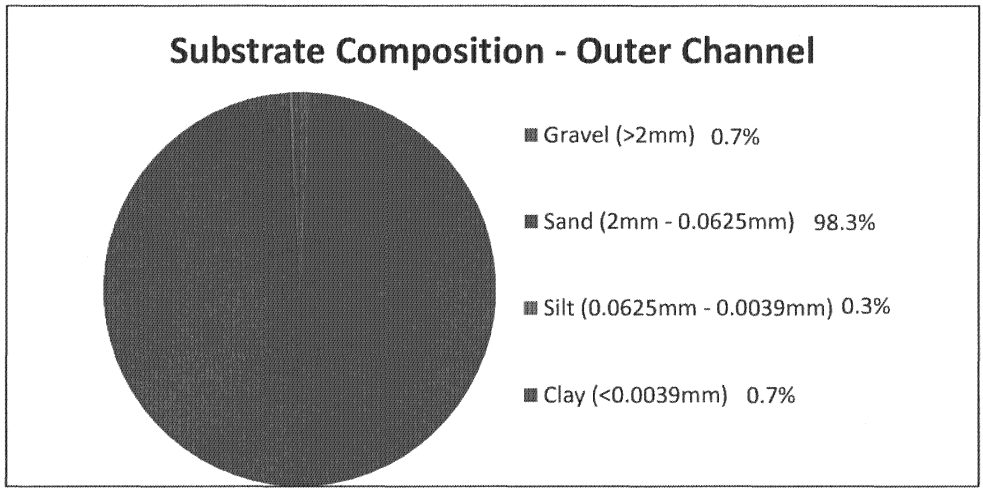


Figure 3.1 Substrate Composition Averaged from Sampling Locations within the Outer Channel at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

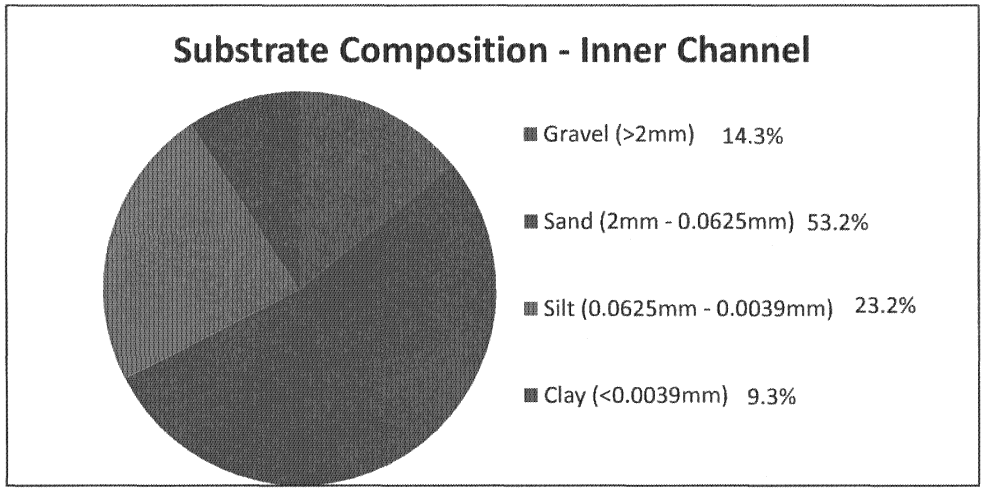


Figure 3.2 Substrate Composition Averaged from Sampling Locations within the Inner Channel at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

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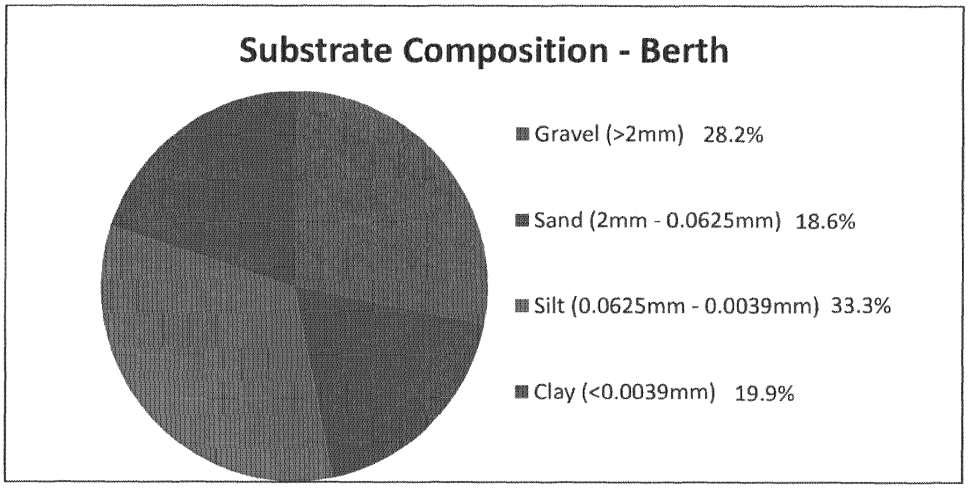


Figure 3.3 Substrate Composition Averaged from Sampling Locations within the Berth at the Transport Canada Ferry Terminal in Caribou, Nova Scotia

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Table 3.1 Dominant Sediment Types at Each Sample Location within the Outer Channel, Inner Channel, and Berth Areas of the Transport Canada Ferry Terminal

Sample ID	Sediment Distribution			
	Primary Substrate	Secondary Substrate	Tertiary Substrate	Quaternary Substrate
Outer Channel				
Car-2014-1-1	Sand	Gravel	Clay	-
Car-2014-1-2	Sand	Clay	-	-
Car-2014-1-3	Sand	Silt	-	-
Inner Channel				
Car-2014-2-1	Sand	Gravel	Clay	Silt
Car-2014-2-2	Silt	Clay	Sand	-
Car-2014-2-3	Sand	Gravel	Silt	Clay
Car-2014-2-4	Sand	Silt	Clay	Gravel
Car-2014-2-5	Silt	Sand	Clay	-
Car-2014-2-6	Gravel	Sand	Silt/Clay	-
Berth				
Car-2014-3-1	Silt	Sand	Clay	Gravel
Car-2014-3-2	Silt	Clay	Sand	Gravel
Car-2014-3-3	Gravel	Sand	Silt/Clay	-
Car-2014-3-5	Gravel	Sand	Clay	Silt
Car-2014-3-6	Silt	Clay	Sand	Gravel
Car-2014-3-8	Silt	Clay	Sand	Gravel

Notes:
"-"indicates none detected.
"/" indicates equal amounts of substrate.

4.0 BENTHIC PHOTOGRAPH DESCRIPTION

A series of underwater photographs were collected at each of the sampling locations that show the substrate and any flora and fauna at the site. Photographs are presented in Appendix A, while a brief description of the photographs collected at each of the sampling locations is provided below.

Outer Channel

Sample Station Car-2014-1-1
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of flora and fauna, however shell hache and macrofloral debris (likely eelgrass (*Zostera marina*)) are present in the area.

Sample Station Car-2014-1-2
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of flora and fauna, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-1-3
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Inner Channel

Sample Station Car-2014-2-1
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-2-2
The substrate appears to be predominantly clay with lesser amounts of sand, gravel, cobble, and rock. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-2-3
The substrate appears to be predominantly sand with minimal amounts of cobble and silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-2-4
Due to poor turbidity, no observations of substrate nor flora or fauna were made.

Sample Station Car-2014-2-5
The substrate appears to be a mix of silt and clay. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-2-6
The substrate appears to be a mix of silt and cobble with lesser amounts of rock and gravel. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. Shell hache and macrofloral debris are present in the area.

Berth

Sample Station Car-2014-3-1
The substrate appears to a mix of rock and gravel with lesser amounts of silt. Macrofaunal life in the photos are restricted to Northern rock barnacles (*Semibalanus balanoides*) and a single rock crab (*Cancer irroratus*). No floral life was noted but macrofloral debris and shell hache are present in the area.

Sample Station Car-2014-3-2
The substrate appears to be a mix of clay, cobble, and rock with lesser amounts of gravel. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. Shell hache and macrofloral debris are present in the area.

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Sample Station Car-2014-3-3
The substrate appears to be a mix of cobble and rock. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. The photos are devoid of faunal life but shell hache and macrofloral debris (likely eelgrass) are present in the area.

Sample Station Car-2014-3-4
The substrate appears to be predominantly rock and cobble. Macrofaunal life in the photos are restricted to Northern rock barnacles. No floral life was noted but macrofloral debris and shell hache are present in the area.

Sample Station Car-2014-3-5
The substrate appears to be predominantly sand and cobble with lesser amounts of rock and silt. Shell hache and macrofloral debris are present, but otherwise the photos are devoid of floral and faunal life.

Sample Station Car-2014-3-6
The substrate appears to be predominantly clay and cobble. Shell hache and macrofloral debris are present, but otherwise the photos are devoid of floral and faunal life.

Sample Station Car-2014-3-7
The substrate appears to be rock and cobble. Macrofaunal life in the photos are restricted to Northern rock barnacles and a single rock crab. No floral life was noted but macrofloral debris and shell hache are present in the area.

Sample Station Car-2014-3-8
The substrate appears to be predominantly silt, clay, and cobble. Macrofaunal life in the photos is restricted to Northern rock barnacles. Shell hache, and macrofloral debris are present, but otherwise the photos are devoid of flora life.

5.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

All samples collected were labelled on site with the date, sample site identifier, and sample number, using a waterproof marker. The samples were placed upright on ice inside a cooler for safe storage and transport, and were delivered to the laboratory following program completion. A copy of the Chain of Custody (COC) form that accompanied the samples is provided in Appendix C. Additional samples were collected to safeguard against loss or damage during transport, and will be stored and refrigerated until the PWGSC Project Manager provides approval to dispose of/destroy the samples.

Sample collection, preparation, and analyses followed guidance provided in the previously referenced Environment Canada document. Samples were analyzed by a laboratory accredited with CALA and/or ISO/IEC 17025 and are certified by the Standards Council of Canada (SCC) for each selected chemical analyses of this program. The complete set of analytical results, including laboratory QA/QC and Certificates of Analyses for all parameters tested, is provided in Appendix C.

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The laboratory undertakes internal duplicate analyses for QA/QC purposes. Laboratory duplicate analyses were performed on all of the parameters analyzed for this program to meet internal QA/QC objectives for the Caribou Ferry samples submitted. No discrepancies were noted by the laboratory for the analyses performed.

To assess the quality of the analytical data, a review of the internal laboratory QA/QC results was completed and included a review of laboratory duplicate analyses, method blanks, surrogates, spike samples, and QA/QC standards. This review did not reveal any information or discrepancies that may affect the analytical results of the Caribou Ferry samples.

A senior Amec Foster Wheeler reviewer has reviewed this report prior to its release. The limitations of this document are provided in Appendix D.

6.0 CONCLUSION

The analytical results of the samples collected and analyzed from the Outer Channel, Inner Channel, and Berth areas of the Transport Canada Ferry Terminal in Caribou, Nova Scotia indicate the following guideline exceedances for metals:

CCME SQGs

- Four marine sediment samples (one Inner Channel sample: Car-2014-2-2 and three Berth samples: Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the CCME SQGs for agricultural land use applications for molybdenum.

Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills

- All twelve marine sediment samples (six Inner Channel and six Berth samples) exceeded the Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills for boron.

Nova Scotia Tier 1 EQS

- Four marine sediment samples from the Berth (Car-2014-3-1, Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the Nova Scotia Tier 1 EQS for agricultural land use applications for hot water soluble boron.
- Four marine sediment samples (one Inner Channel sample: Car-2014-2-2 and three samples Berth samples: Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) exceeded the Nova Scotia Tier 1 EQS for agricultural, residential/parkland, and commercial land use applications for aluminium.
- Eight marine sediment samples (three Inner Channel samples: Car-2014-2-2, Car-2014-2-5, and Car-2014-2-6 and five Berth samples: Car-2014-3-1, Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded the Nova Scotia Tier 1 EQS for agricultural, residential/parkland, and commercial land use applications for iron.
- All five leachate samples from the Berth (Car-2014-3-1, Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded the Nova Scotia Tier 1 EQS for Surface Water (Freshwater and Marine) for selenium, while three of five leachate samples exceeded this guideline for boron (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) and copper (Car-2014-3-1, Car-2014-3-2, and Car-2014-3-3).
- One Berth leachate sample exceeded the Nova Scotia Tier 1 EQS for Surface Water (Marine) for cadmium (Car-2014-3-1) and lead (Car-2014-3-6).

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CCME WQGs for the Protection of Aquatic Life

- All five Berth leachate samples (Car-2014-3-1, Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded the CCME WQGs for the Protection of Aquatic Life (Freshwater) for selenium; four of the five (Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded for aluminium, three (Car-2014-3-2, Car-2014-3-3, and Car-2014-3-8) exceeded for boron, and one (Car-2014-3-6) exceeded for iron.
- Four of five Berth leachate samples (Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8) exceeded the CCME WQG for the Protection of Aquatic Life (Freshwater and Marine) for pH.

Health Canada CGDWQs

- Four of the five Berth leachate samples exceeded the Health Canada CGDWQ (Aesthetic Objective) for sodium (Car-2014-3-1, Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8) and for pH (Car-2014-3-2, Car-2014-3-3, Car-2014-3-6, and Car-2014-3-8); three of the samples exceeded for molybdenum (Car-2014-3-2, Car-2014-3-6, and Car-2014-3-8), and one for iron (Car-2014-3-6).

7.0 CLOSING

This document has been prepared and reviewed by the following people:

Prepared by:

[redacted]
Project Manager /
Intermediate Project Professional

and

Maureen Cameron-MacMillan, M.Sc.
Technical Support /
Intermediate Project Professional

Reviewed by:

Beth Cameron, M.Sc.
Environmental Scientist /
Senior Project Professional

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8.0 REFERENCES

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amec foster wheeler

APPENDIX A
Photo Log

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Caribou Ferry Terminal Outer Channel

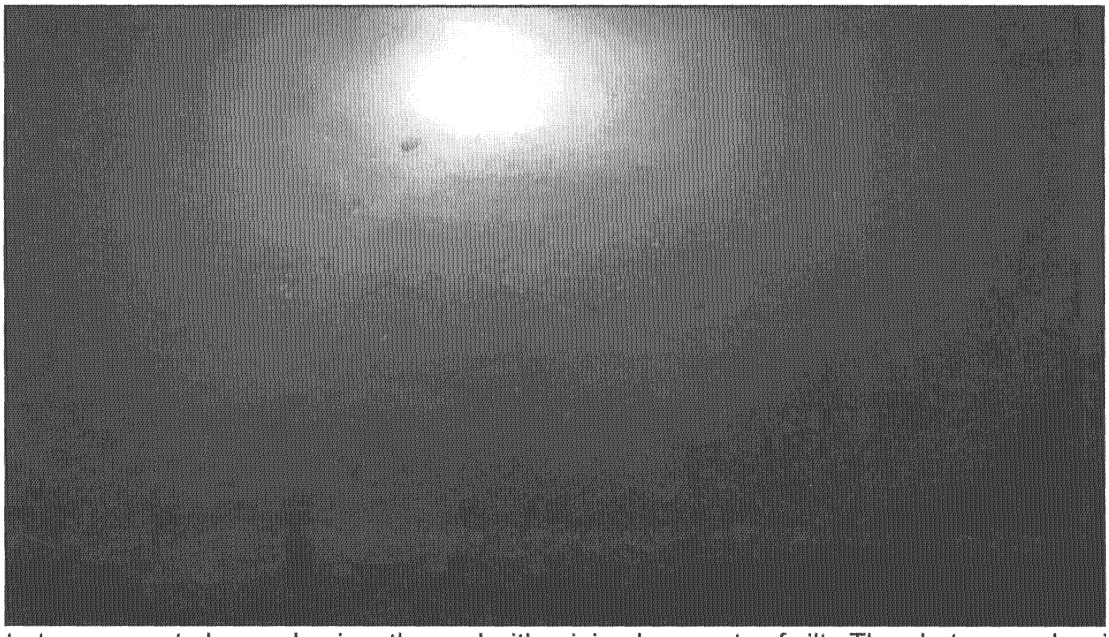
Sample Stations:
Car-2014-1-1
Car-2014-1-2
Car-2014-1-3

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-1-1



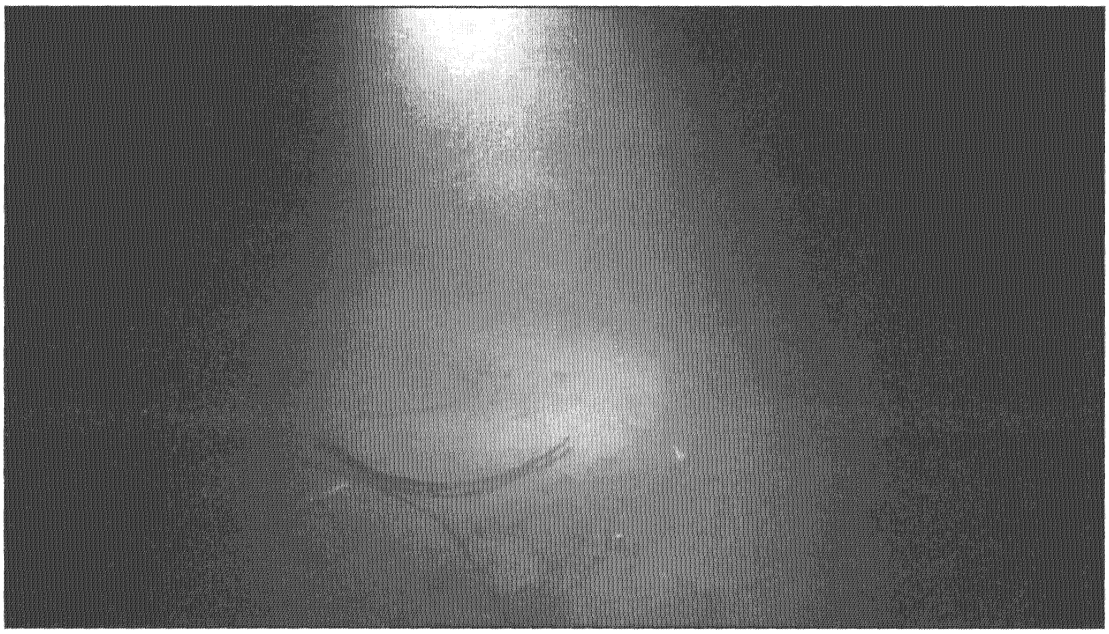


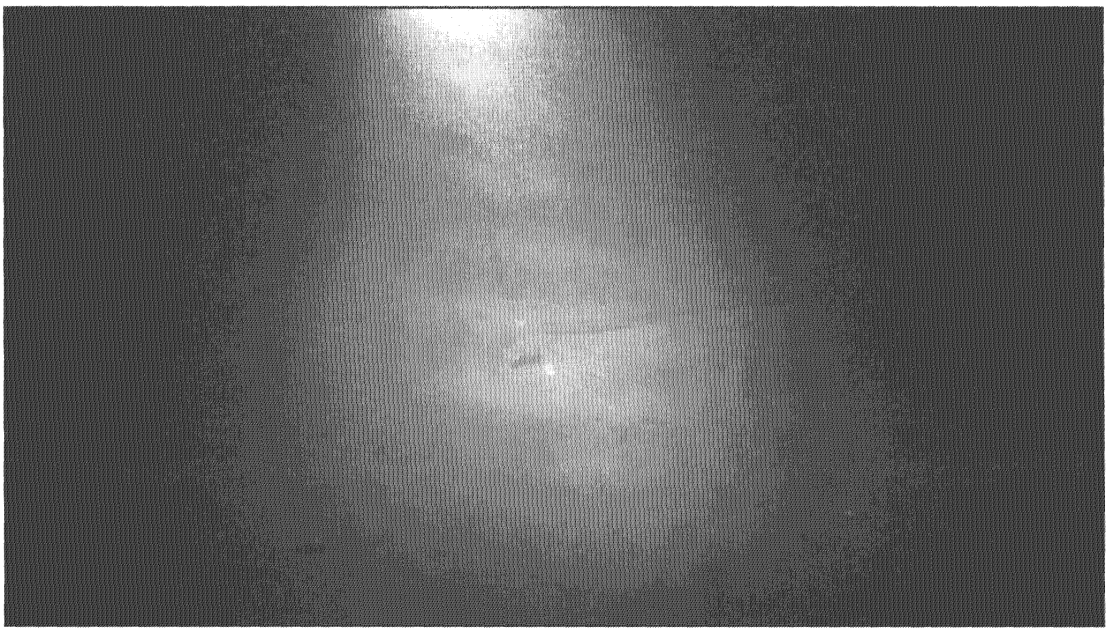
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of flora and fauna, however shell hache and macrofloral debris (likely eelgrass (Zostera marina)) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-1-2





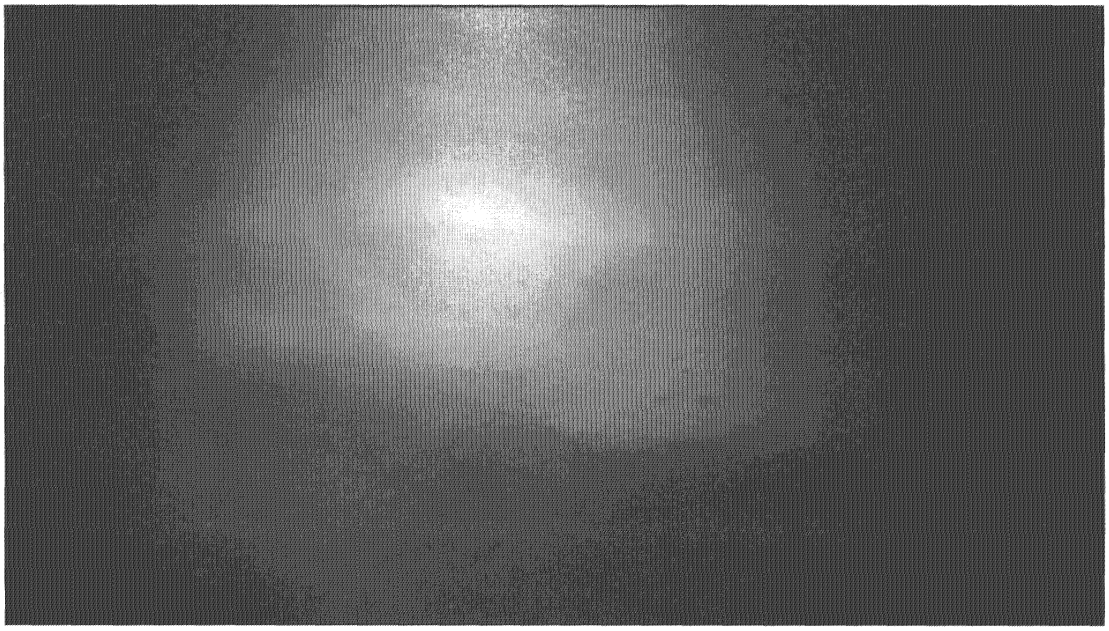
The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of flora and fauna, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-1-3





The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Caribou Ferry Terminal Inner Channel

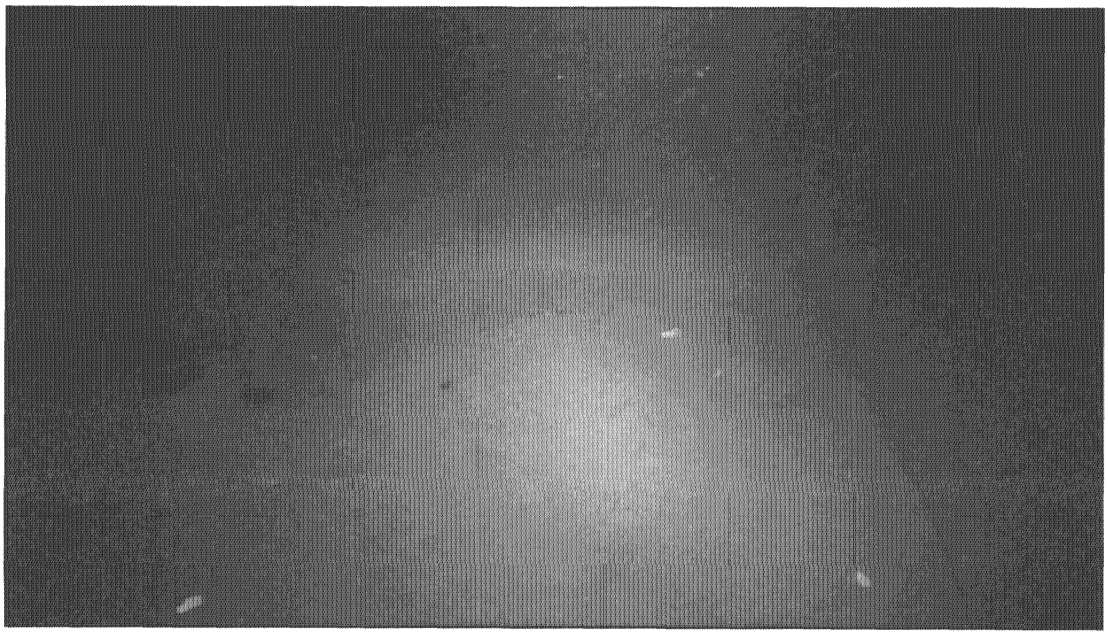
Sample Stations:

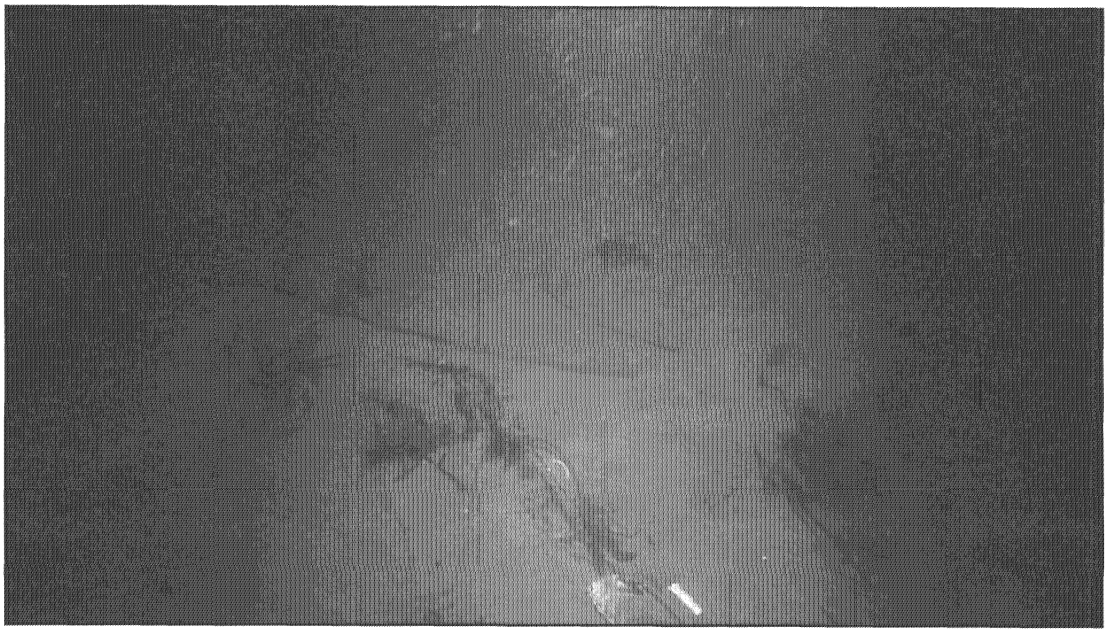
Car-2014-2-1
Car-2014-2-2
Car-2014-2-3
Car-2014-2-4
Car-2014-2-5
Car-2014-2-6

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-1





The substrate appears to be predominantly sand with minimal amounts of silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-2



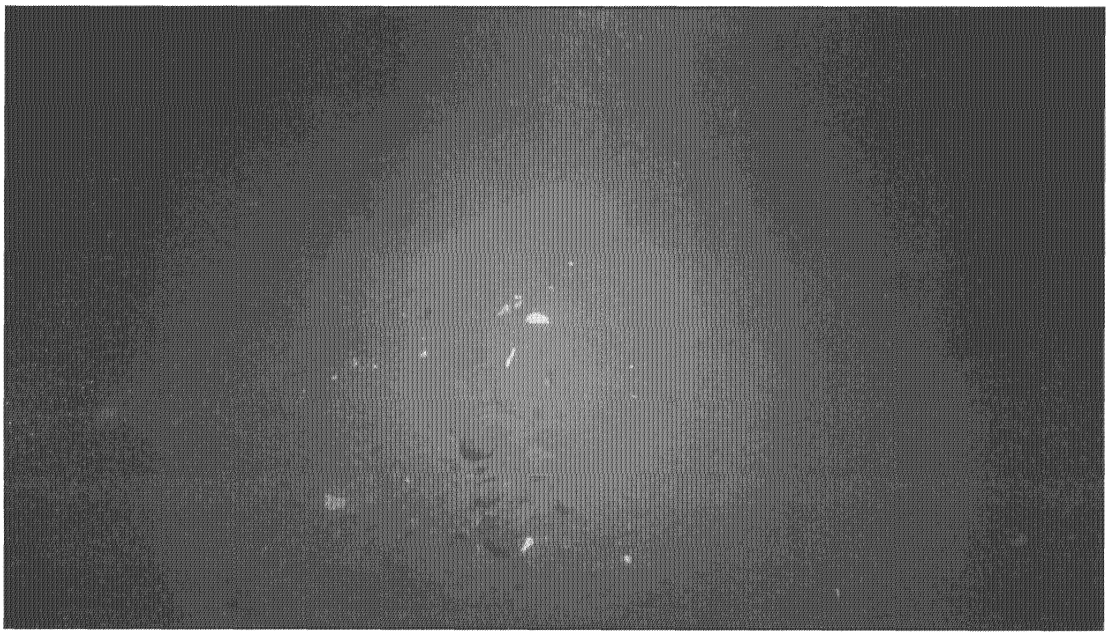


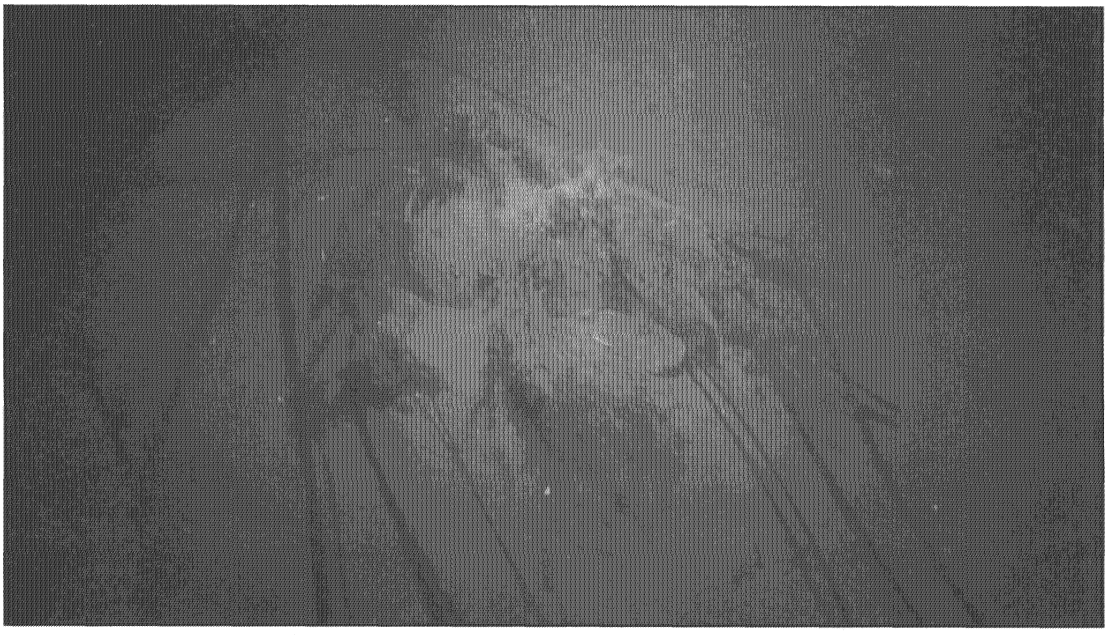
The substrate appears to be predominantly clay with lesser amounts of sand, gravel, cobble, and rock. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-3



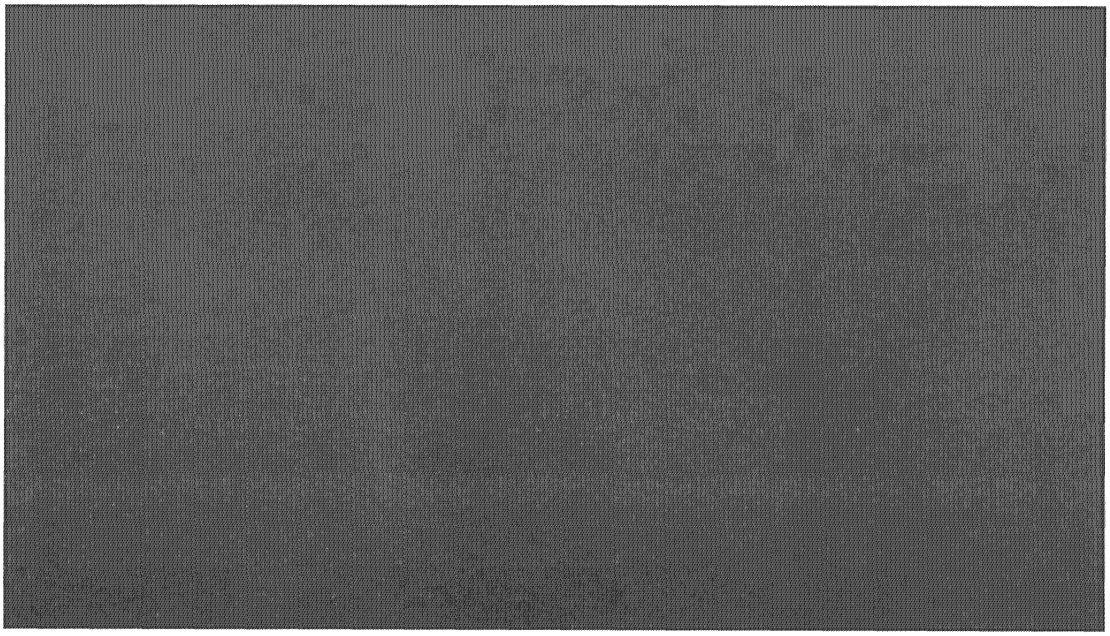


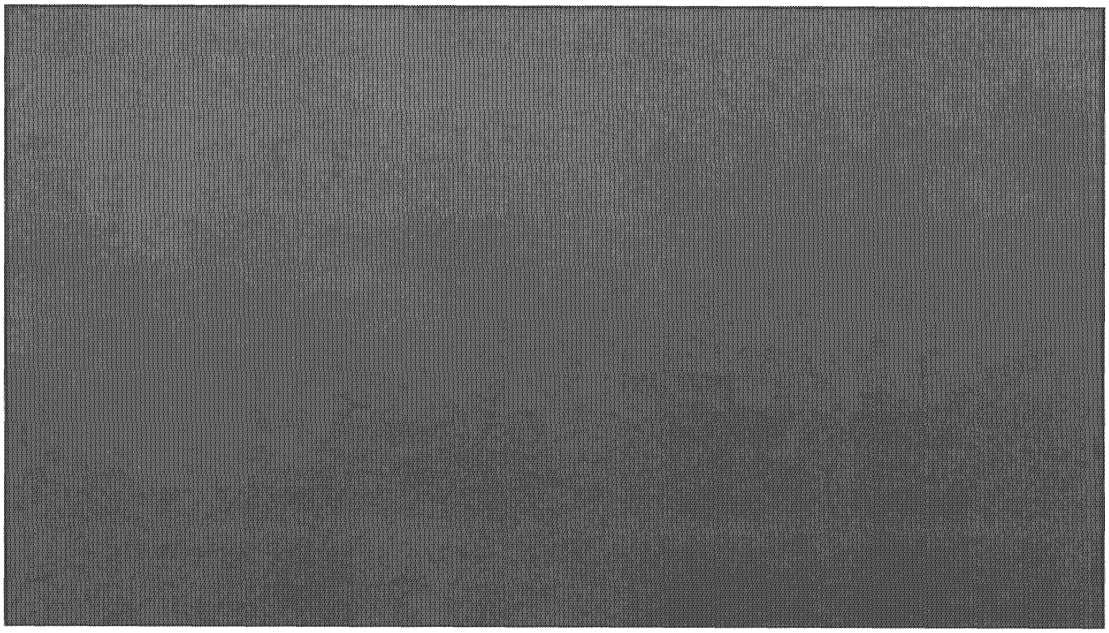
The substrate appears to be predominantly sand with minimal amounts of cobble and silt. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-4



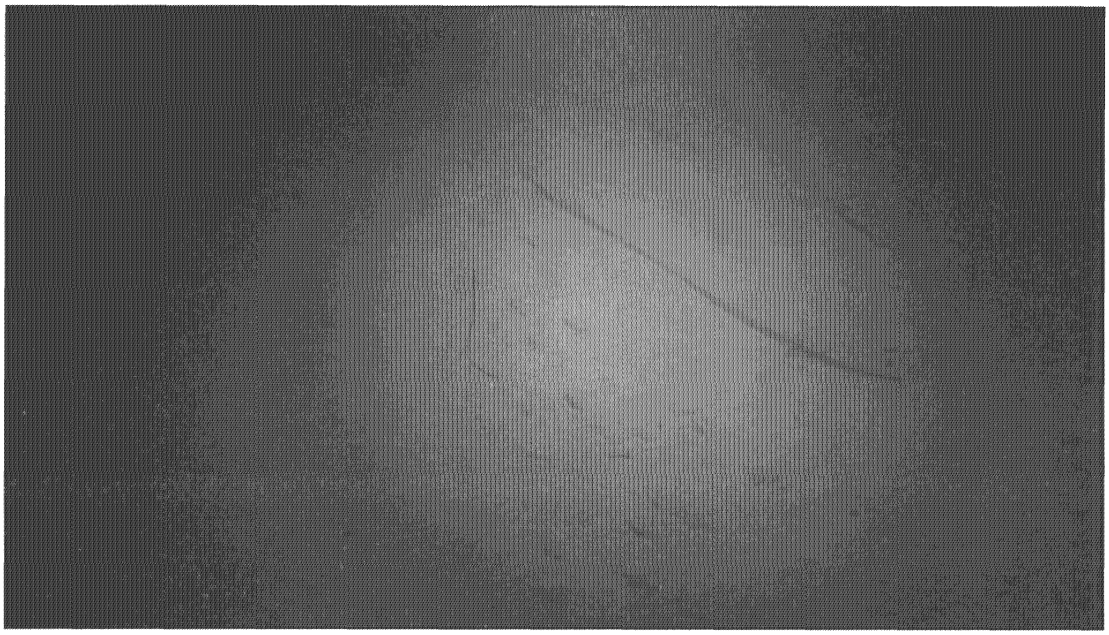


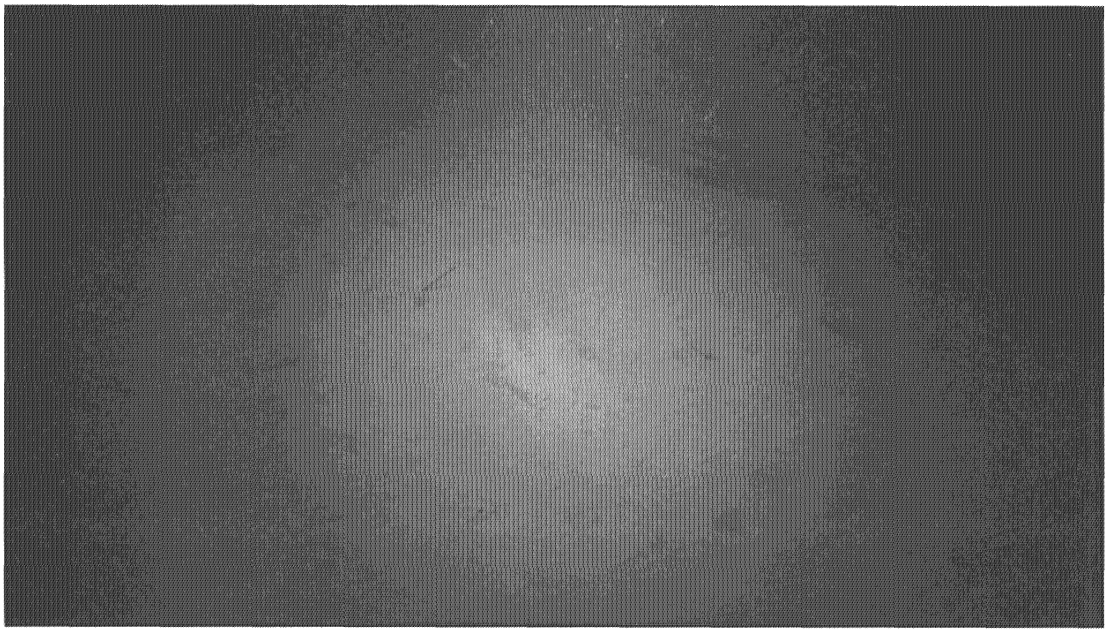
Due to poor turbidity, no observations of substrate nor flora or fauna were made.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-5



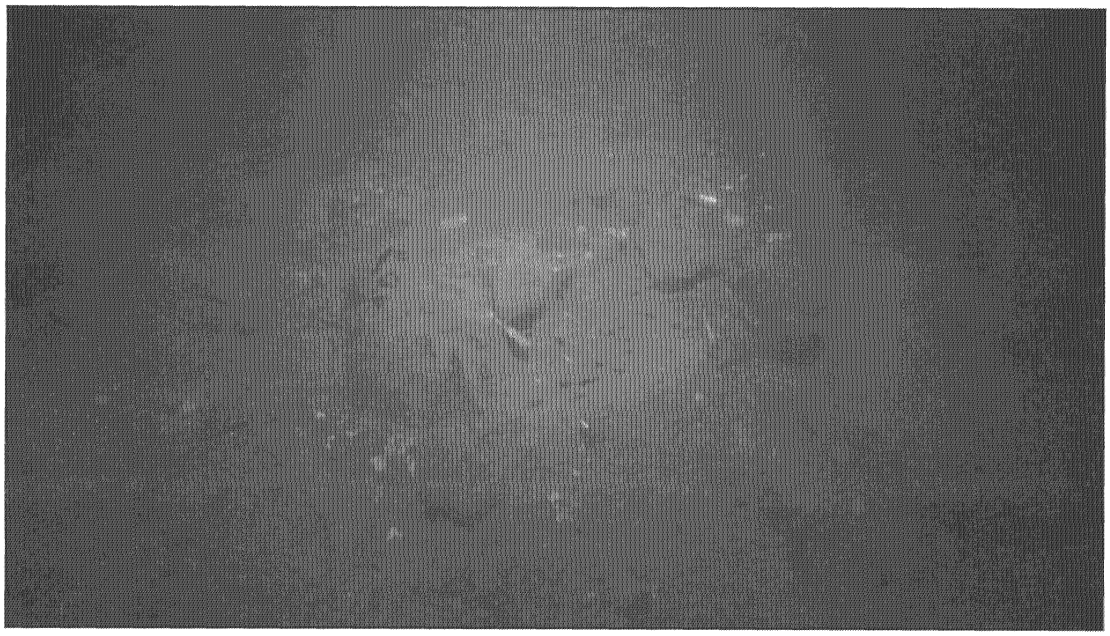


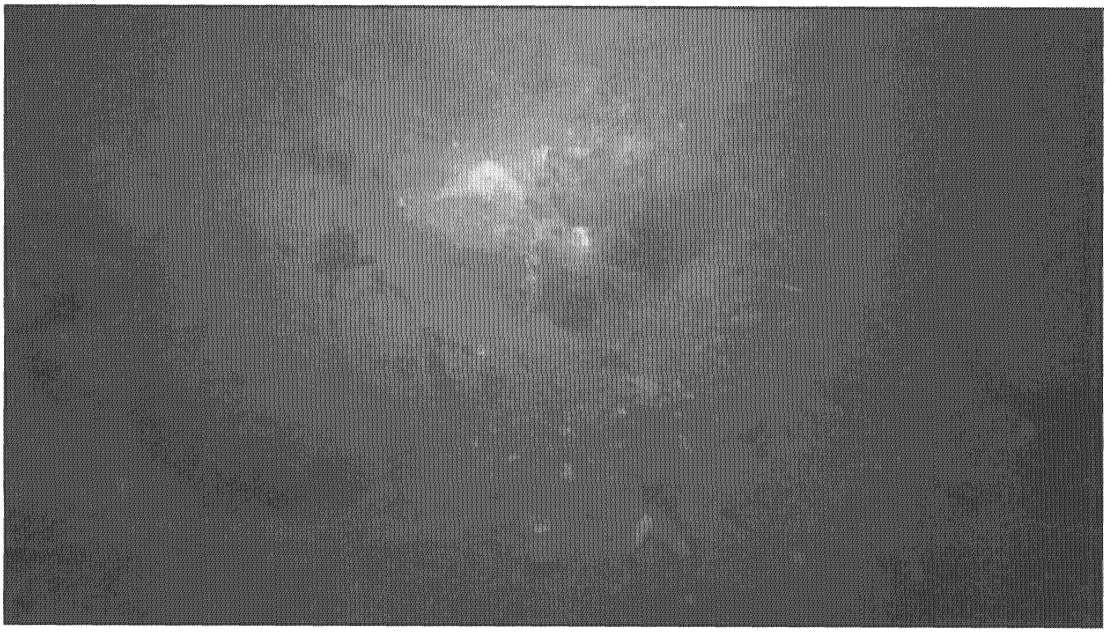
The substrate appears to be a mix of silt and clay. The photos are devoid of floral and faunal life, however shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-2-6





The substrate appears to be a mix of silt and cobble with lesser amounts of rock and gravel. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. Shell hache and macrofloral debris are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Caribou Ferry Terminal Berth

Sample Stations:

Car-2014-3-1
Car-2014-3-2
Car-2014-3-3
Car-2014-3-4
Car-2014-3-5
Car-2014-3-6
Car-2014-3-7
Car-2014-3-8

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-1



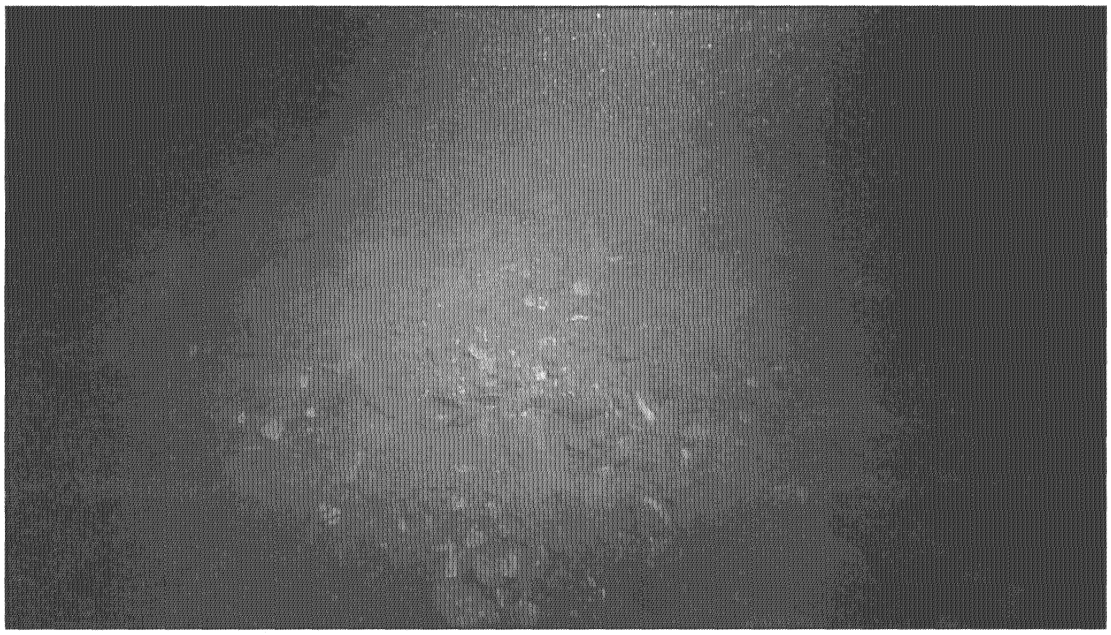


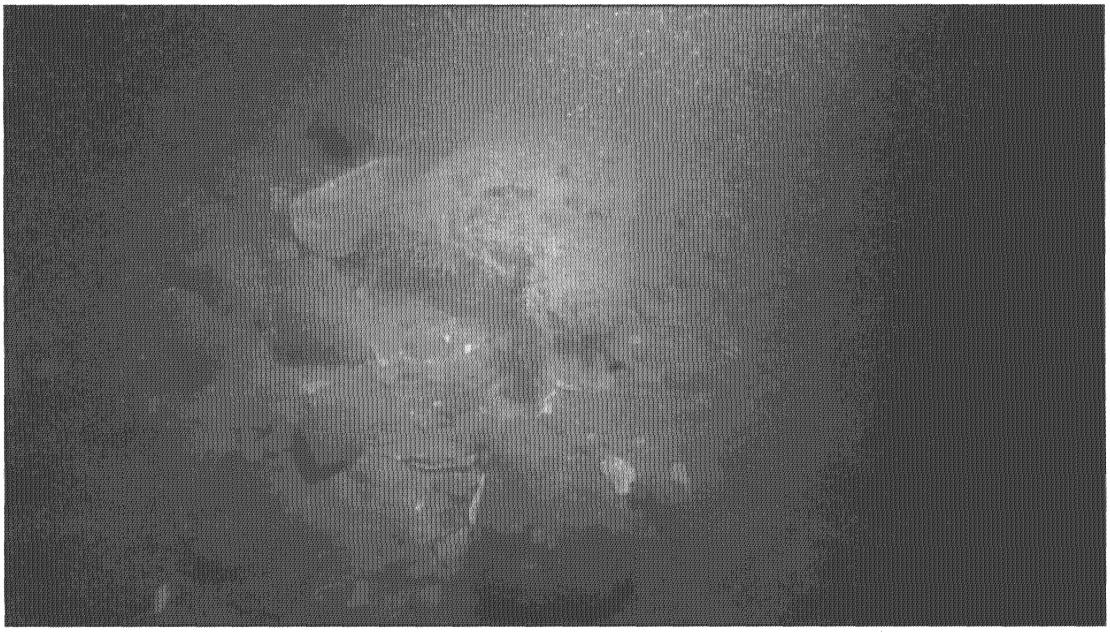
The substrate appears to a mix of rock and gravel with lesser amounts of silt. Macrofaunal life in the photos are restricted to Northern rock barnacles (*Semibalanus balanoides*) and a single rock crab (*Cancer irroratus*). No floral life was noted but macrofloral debris and shell hache are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-2



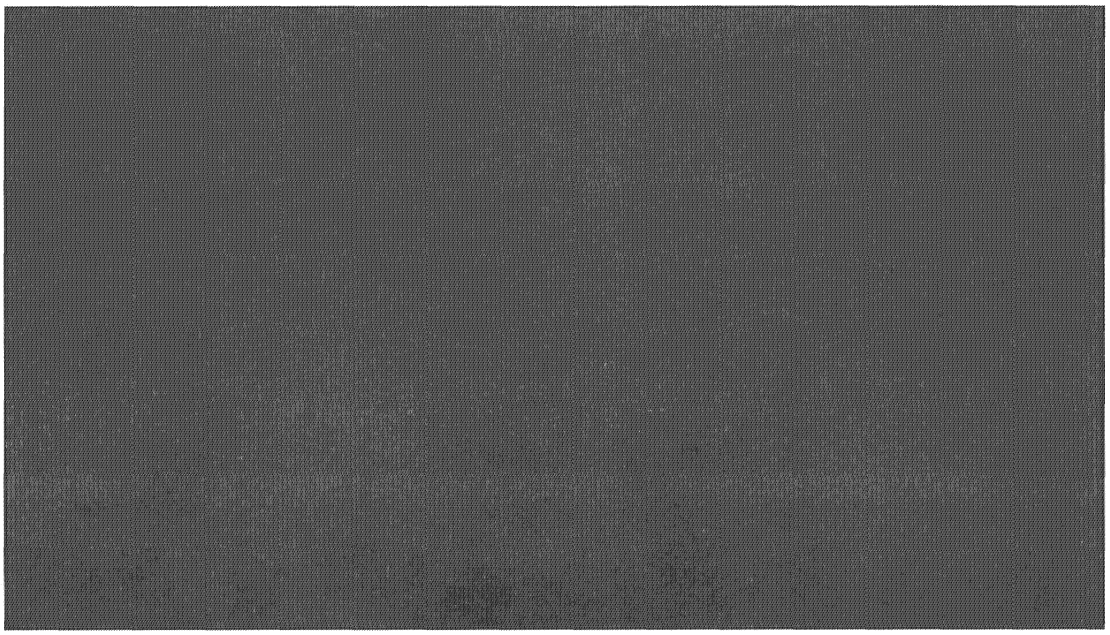


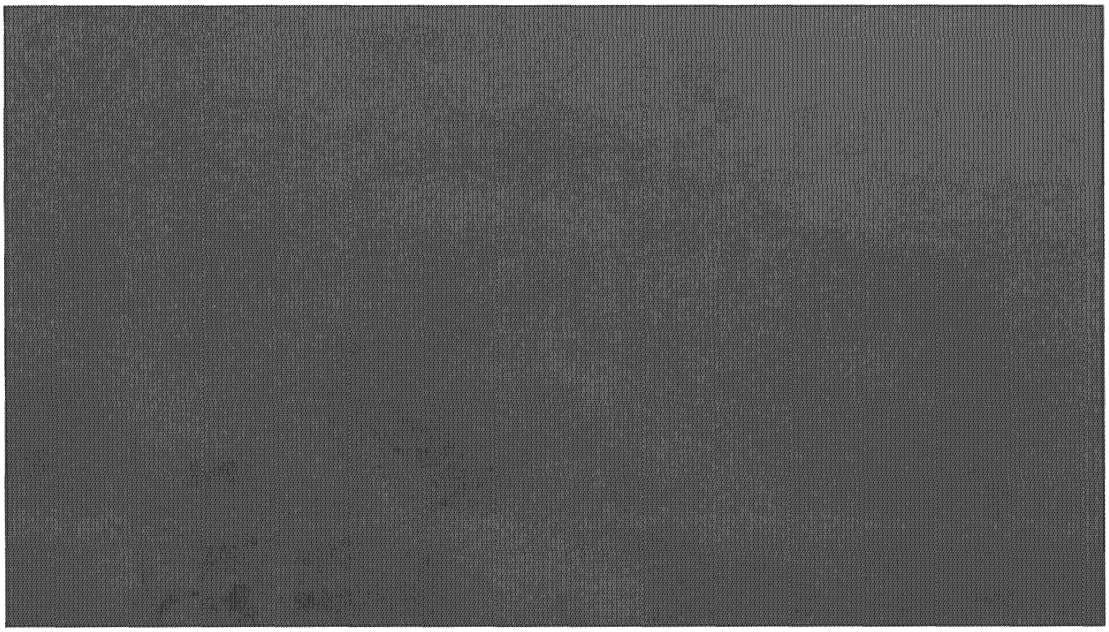
The substrate appears to be a mix of clay, cobble, and rock with lesser amounts of gravel. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. Shell hache and macrofloral debris are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-3



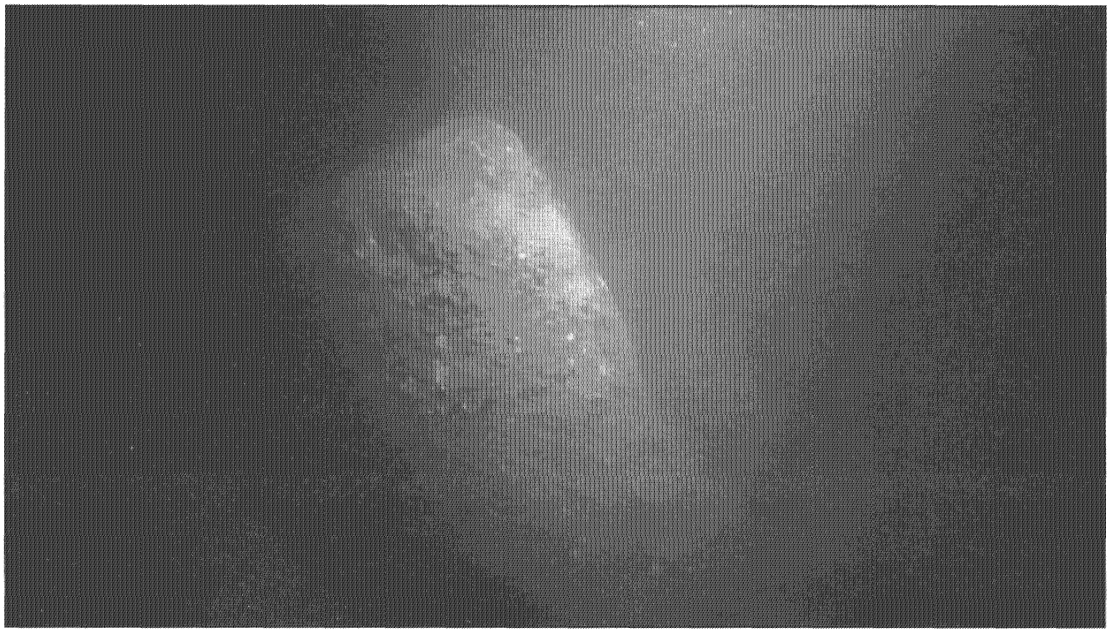


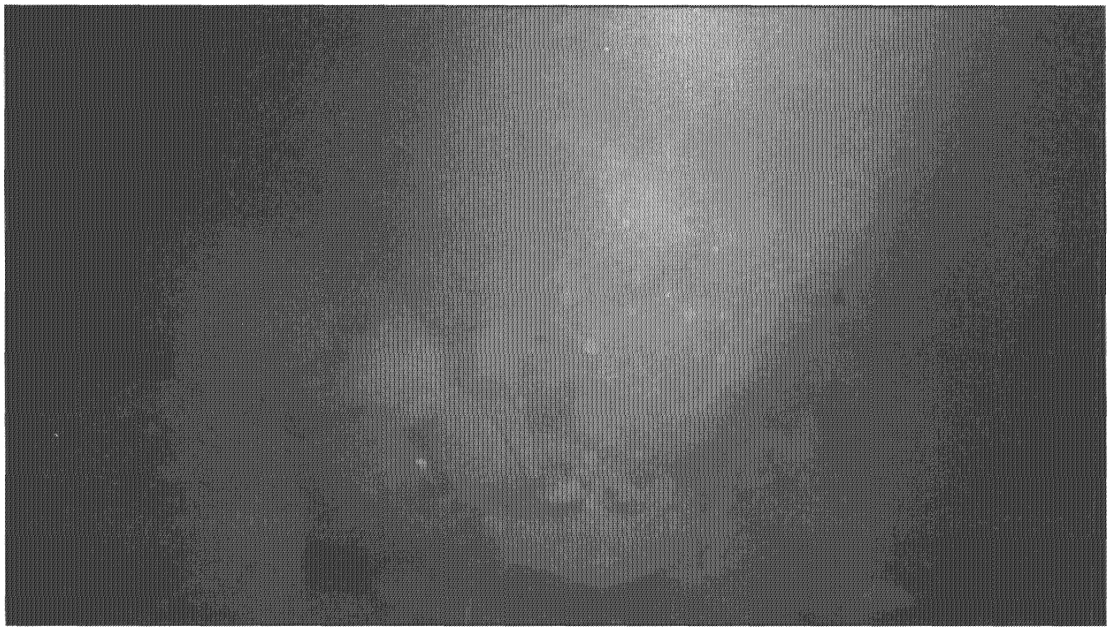
The substrate appears to be a mix of cobble and rock. Hard substrates have limited algal cover, otherwise the photos are devoid of floral life. The photos are devoid of faunal life but shell hache and macrofloral debris (likely eelgrass) are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-4





The substrate appears to be predominantly rock and cobble. Macrofaunal life in the photos are restricted to Northern rock barnacles. No floral life was noted but macrofloral debris and shell hache are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-5





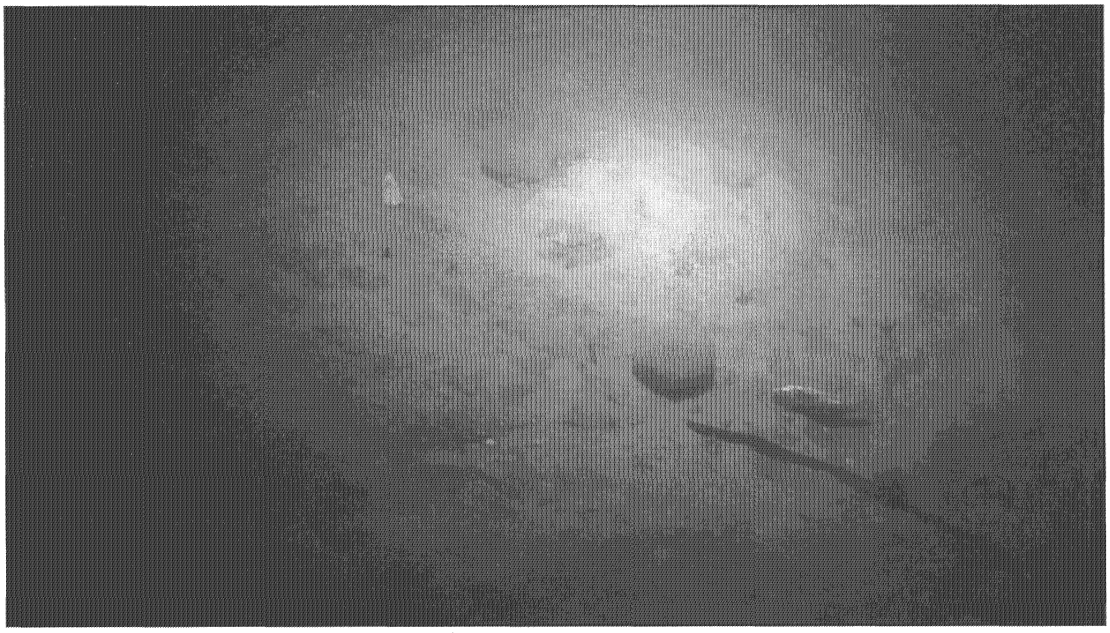
The substrate appears to be predominantly sand and cobble with lesser amounts of rock and silt. Shell hache and macrofloral debris are present, but otherwise the photos are devoid of floral and faunal life.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-6





The substrate appears to be predominantly clay and cobble. Shell hache and macrofloral debris are present, but otherwise the photos are devoid of floral and faunal life.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-7



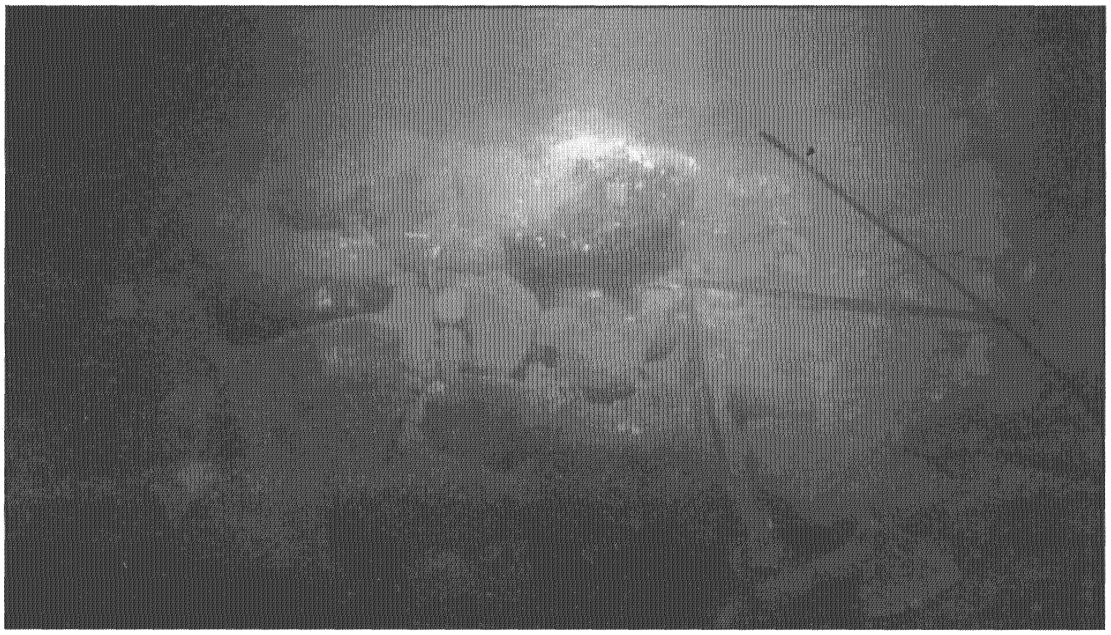


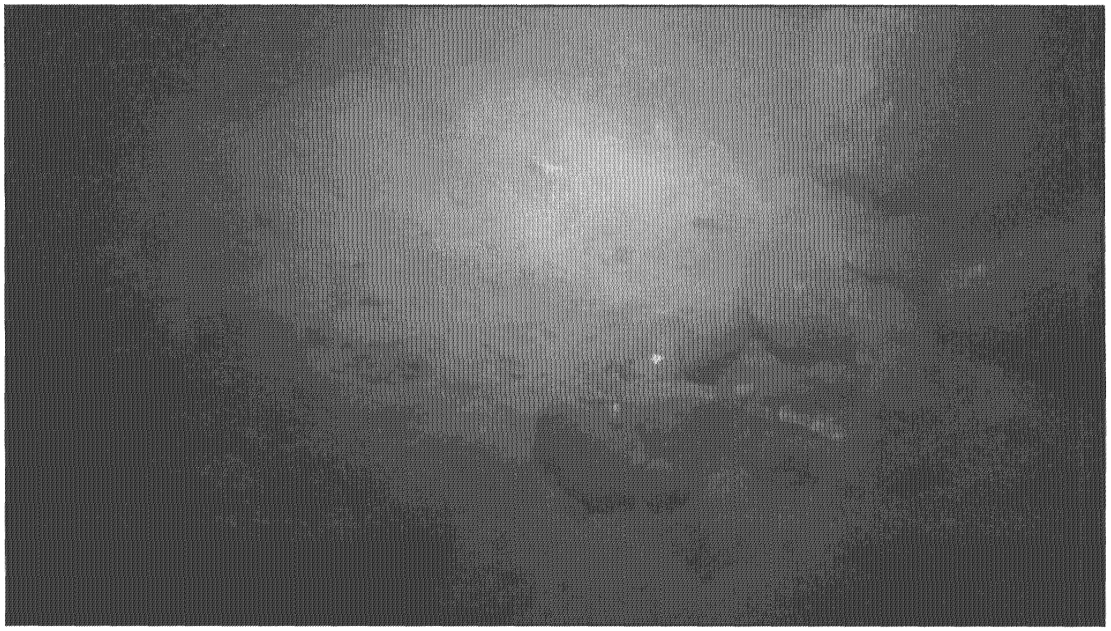
The substrate appears to be rock and cobble. Macrofaunal life in the photos are restricted to Northern rock barnacles and a single rock crab. No floral life was noted but macrofloral debris and shell hache are present in the area.

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Public Works and Government Services Canada
Marine Sediment Sampling Program
Transport Canada Caribou Ferry Terminal, Caribou, NS
Program Date: 15 December 2014
Photo Log

Sample Station Car-2014-3-8





The substrate appears to be predominantly silt, clay, and cobble. Macrofaunal life in the photos is restricted to Northern rock barnacles. Shell hache, and macrofloral debris are present, but otherwise the photos are devoid of flora life.

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amec foster wheeler

APPENDIX B
Analytical Summary Tables

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Table B1.1 Grain Size and Total Organic Carbon Results for Marine Sediments - Transport Canada Caribou Ferry Terminal Outer Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date		
			Car-2014-1-1	Car-2014-1-2	Car-2014-1-3
			15 December, 2014		
Grain Size Results					
< PHI -4 (12.5 mm)	0 1	%	100	100	100
< PHI -3 (9 5 mm)	0 1		100	100	100
< PHI -2 (4.75 mm)	0.1		100	100	100
< PHI -1 (2 mm)	0 1		98 5	100	100
< PHI 0 (1 mm)	0 1		89.4	100	100
< PHI +1 (1/2 mm)	0 1		36.1	97.5	97.5
< PHI +2 (1/4 mm)	0.1		2 6	13.4	13.6
< PHI +3 (1/8 mm)	0.1		1.7	1.8	2
< PHI +4 (1/16 mm)	0.1		1.7	1 3	1.7
< PHI +5 (1/32 mm)	0 1		1 6	1 3	1.6
< PHI +6 (1/64 mm)	0 1		1 5	1.3	1 4
< PHI +7 (1/128 mm)	0 1		1.5	1.3	0 4
< PHI +8 (1/256 mm)	0.1		1.3	1 2	0.4
< PHI +9 (1/512 mm)	0 1		1.3	1 1	0 4
Gravel	1		2	<1	<1
Sand	1		97	99	98
Silt	1		<1	<1	1
Clay	1		1	1	<1
Other					
Total Organic Carbon (TOC)	0 15	g/kg	<0.15	0.35	<0 15

NOTE(S):

Light values indicate results below detection limit.

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Table B2.1 PAH Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines					
										Interim Sediment Quality Guidelines		Probable Effects Levels		Human Health		Environmental Health			
														Potable Water	Direct Contact	Soil Contact		Soil and Food Ingestion	Freshwater Life
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6											
			15 December, 2014							Freshwater	Marine	Freshwater	Marine	Agricultural, Residential/ Parkland, Commercial and Industrial Land Uses	Agricultural, Residential/ Parkland, Commercial and Industrial Land Uses	Agricultural and Residential/ Parkland Land Uses	Commercial and Industrial Land Uses	Agricultural and Residential/ Parkland Land Uses	Agricultural, Residential/ Parkland, Commercial/ Industrial Land Uses
Polycyclic Aromatic Hydrocarbon (PAH) Results																			
1-Methylnaphthalene	0.05		<0 05	<0 05	<0.05	<0 05	<0 05	<0 05											
2-Methylnaphthalene	0.02		<0 02	<0.02	<0.02	<0 02	<0.02	<0 02		0.0202	0.0202	0.201	0.201						
Acenaphthene	0.00671		<0 00671	<0 00671	<0 00671	<0 00671	<0 00671	<0 00671		0.00671	0.00671	0.0889	0.0889					21.5	0.28
Acenaphthylene	0.005		<0 005	<0 005	<0 005	<0 005	<0 005	<0 005		0.00587	0.00587	0.128	0.128						320
Anthracene	0 04		<0 04	<0 04	<0 04	<0 04	<0 04	<0 04		0.0469	0.0469	0 245	0.245			2.5	3.2	61.5	
Benz(a)anthracene	0.01		<0 01	<0 01	<0.01	<0 01	<0 01	<0 01		0.0371	0.0748	0.385	0 693	0.33				6.2	
Benzo(a)pyrene	0.01		<0 01	<0 01	<0.01	<0 01	<0 01	<0.01		0 0319	0 0888	0.782	0.763	0.37		20	72	0 6	8800
Benzo(b)fluoranthene	0.05		<0 05	<0.05	<0 05	<0.05	<0 05	<0.05										6 2	
Benzo(b+j)fluoranthene	0.1		<0 1	<0 1	<0 1	<0.1	<0 1	<0 1						0.16					
Benzo(g,h,i)perylene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01						6.8					
Benzo(j)fluoranthene	Calculation	mg/kg	<0 1	<0 1	<0.1	<0 1	<0.1	<0 1											
Benzo(k)fluoranthene	0 01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01						0 034				6.2	
Chrysene	0.01		<0 01	<0 01	<0.01	<0 01	<0 01	<0 01		0 0571	0 108	0.862	0 846	2.1				6.2	
Dibenz(a,h)anthracene	0.006		<0 006	<0 006	<0 006	<0 006	<0.006	<0 006		0.00622	0 00622	0.135	0.135	0 23					
Fluoranthene	0.05		<0 05	<0.05	<0 05	<0.05	<0.05	<0 05		0.111	0.113	2.355	1.494			50	180	15 4	
Fluorene	0.02		<0 02	<0 02	<0 02	<0.02	<0 02	<0 02		0.0212	0.0212	0 144	0.144					15.4	0.25
Indeno(1,2,3-cd)pyrene	0 01		<0 01	<0 01	<0 01	<0 01	<0 01	<0.01						2.7					
Naphthalene	0.01		<0 01	<0.01	<0.01	<0 01	<0 01	<0 01		0.0346	0.0346	0.391	0.391					8.8	0.013
Perylene	0.05		<0 05	<0 05	<0 05	<0.05	<0.05	<0 05											
Phenanthrene	0.04		<0 04	<0 04	<0.04	<0.04	<0.04	<0 04		0.0419	0 0867	0.515	0.544					43	0.046
Pyrene	0.05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05		0.053	0.153	0.875	1.398					7.7	
Total PAH	0 5		<0 5	<0 5	<0 5	<0 5	<0 5	<0 5	2.5										
Index of Additive Cancer Risk (IACR)	Calculation	None	0.51	0.51	0.51	0.51	0.51	0.51						1					
Benzo(a)pyrene TPE (10^{-5})	Calculation	mg/kg	0.015	0.015	0.015	0.015	0 015	0.015							5.3				
Creosote or Coal Tar source suspected/known?	yes/no		No	No	No	No	No	No											
Uncertainty Factor Applied	yes/no		No	No	No	No	No	No											
Benzo(a)pyrene TPE (10^{-5}) with UF	Calculation	mg/kg	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable							5 3				

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations.

Total PAH calculation based on the sum of 16 individual PAH compounds (acenapthene, acenapthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, ideno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) as per guidance from Environment Canada, 2009.

Additive Cancer Risk (IACR) = ([Benz(a)anthracene]/0.33mg/kg) + ([Benzo(a)pyrene]/0.37mg/kg) + ([Benzo(b+j)fluoranthene]/0.16mg/kg) + ([Benzo(g,h,i)perylene]/6.8mg/kg) + ([Benzo(k)fluoranthene]/0.034mg/kg) + ([Chrysene]/2.1mg/kg) + ([Dibenz(a,h)anthracene]/0.23mg/kg) + ([Indeno(1,2,3-c,d)pyrene]/2.7mg/kg).

Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10^{-5}).

Benzo(a)pyrene TPE (10^{-5}) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Potency Equivalency Factors: ([Benz(a)anthracene]*0 1) + ([Benzo(a)pyrene]*1) + ([Benzo(b+j)fluoranthene]*0.1) + ([Benzo(k)fluoranthene]*0.1) + ([Benzo(g,h,i)perylene]*0 01) + ([Chrysene]*0.01) + ([Dibenz

Benzo(a)pyrene TPE Uncertainty Factor = 3.

Light values indicate results below detection limit

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Table B2.2 PAH Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards													
										Sediment Environment		Potable Site						Non-Potable Site					
												Fine-Grained Soil			Coarse-Grained Soil			Fine-Grained Soil			Coarse-Grained Soil		
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6		Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Uses	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Uses	Commercial and Industrial Land Uses
			15 December, 2014																				
Polycyclic Aromatic Hydrocarbon (PAH) Results																							
1-Methylnaphthalene	0.05	mg/kg	<0.05	<0 05	<0 05	<0 05	<0.05	<0 05	10	0 201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
2-Methylnaphthalene	0.02		<0 02	<0.02	<0 02	<0 02	<0.02	<0 02	10	0 201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
Acenaphthene	0.00671		<0 00671	<0.00671	<0 00671	<0.00671	<0 00671	<0 00671	10	0.0889	0.0889	21 5	5300	8000	21.5	3900	8000	21.5	5300	8000	21 5	3900	8000
Acenaphthylene	0.005		<0 005	<0 005	<0.005	<0 005	<0 005	<0 005	10	0 128	0.128	32	32	32	4 5	4.5	23	33	33	96	4.5	4 5	66
Anthracene	0.04		<0.04	<0 04	<0.04	<0.04	<0 04	<0.04	10	0.245	0.245	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000
Benz(a)anthracene	0.01		<0 01	<0 01	<0.01	<0.01	<0 01	<0 01	10	0.385	0.693	0.63			0.5			0.63			0.5		
Benzo(a)pyrene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	0.782	0 763	0 6			0.6			0.6			0 6		
Benzo(b)fluoranthene	0 05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	10	13 4	4.5	6 2			6.2			6.2			6.2		
Benzo(b+j)fluoranthene	0.1		<0 1	<0.1	<0.1	<0 1	<0 1	<0.1															
Benzo(g,h,i)perylene	0 01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	3.2	3.2	8.3			6 6			8 3			6.6		
Benzo(j)fluoranthene	Calculation		<0.1	<0.1	<0 1	<0.1	<0.1	<0.1	10	13.4	4 5	6.2			6.2			6 2			6 2		
Benzo(k)fluoranthene	0.01		<0 01	<0 01	<0.01	<0.01	<0 01	<0 01	10	13.4	4.5	6.2			6 2			6 2			6.2		
Chrysene	0 01		<0 01	<0 01	<0 01	<0.01	<0 01	<0 01	10	0.862	0 846	6 2			6 2			6.2			6 2		
Dibenz(a,h)anthracene	0 006		<0 006	<0 006	<0 006	<0 006	<0 006	<0 006	10	0 135	0 135												
Fluoranthene	0.05		<0 05	<0 05	<0 05	<0.05	<0 05	<0 05	10	2 355	1.494	15.4	3500	5300	15 4	3500	5300	15.4	3500	5300	15 4	3500	5300
Fluorene	0.02		<0 02	<0 02	<0.02	<0 02	<0 02	<0 02	10	0.144	0.144	15.4	2700	4100	15 4	2700	4100	15.4	2700	4100	15 4	2700	4100
Indeno(1,2,3-cd)pyrene	0 01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	3.2	0.88	0.48			0.38			0 48			0.38		
Naphthalene	0.01		<0 01	<0.01	<0 01	<0 01	<0 01	<0 01	10	0.391	0.391	0.75	28	28	0.6	2.2	25	0.75	51	370	0.6	2.2	25
Perylene	0.05		<0 05	<0 05	<0.05	<0 05	<0 05	<0 05	10														
Phenanthrene	0 04		<0 04	<0.04	<0 04	<0 04	<0 04	<0 04	10	0 515	0 544	7 8	17	24	6 2	17	17	7.8			6 2		
Pyrene	0 05		<0 05	<0 05	<0 05	<0.05	<0 05	<0 05	10	0.875	1 398	7 7	2100	3200	7.7	2100	3200	7 7	2100	3200	7.7	2100	3200
Total PAH	0.5		<0 5	<0 5	<0 5	<0 5	<0 5	<0.5	50														
Benzo(a)pyrene TPE (10^{-5})	Calculation	mg/kg	0 015	0.015	0.015	0 015	0.015	0.015				5.3	5 3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Creosote or Coal Tar source suspected/known?	yes/no		No	No	No	No	No	No															
Uncertainty Factor Applied	yes/no		No	No	No	No	No	No															
Benzo(a)pyrene TPE (10^{-5}) with UF	Calculation	mg/kg	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				5.3	5.3	5.3	5 3	5.3	5.3	5.3	5.3	5 3	5.3	5.3	5.3

NOTE(S).

Total PAH calculation based on the sum of 16 individual PAH compounds (acenapthene, acenapthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, Indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) as per guidance from Environment Canada, 2009.

Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10^{-5}).

Benzo(a)pyrene TPE (10^{-5}) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Potency Equivalency Factors: ([Benz(a)anthracene]*0.1) + ([Benzo(a)pyrene]*1) + ([Benzo(b+j)fluoranthene]*0.1) + ([Benzo(k)fluoranthene]*0.1) + ([Benzo(g,h,i)perylene]*0 01) + ([Chrysene]*0 01) + ([Dibenz(a,h)anthracene]*1) + ([Indeno(1

Benzo(a)pyrene TPE Uncertainty Factor = 3

Light values indicate results below detection limit

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Table B2.6 PCB and DDT Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards															
										Sediment Environment		Potable Site								Non-Potable Site				
												Fine-Grained Soils				Coarse-Grained Soils				Fine-Grained Soils	Coarse-Grained Soils	Fine- and Coarse-Grained Soils		
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6																	
			15 December, 2014							Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
Polychlorinated Biphenyl (PCB) Results																									
Total PCB Concentration	0 022	mg/kg	<0 0215	<0.0215	<0.0215	<0.0215	<0 0215	<0.0215	50	0.277	0.189	1.3	22	33	33	1.3	22	33	33	1.3	1.3	22	33	33

NOTE(S):

Light values indicate results below detection limit.

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Table B3.1 PAH Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines					
										Interim Sediment Quality Guidelines		Probable Effects Levels		Human Health		Environmental Health			
														Potable Water	Direct Contact	Soil Contact		Soil and Food Ingestion	Freshwater Life
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8											
			15 December, 2014							Freshwater	Marine	Freshwater	Marine	Agricultural, Residential/ Parkland, Commercial and Industrial Land Uses	Agricultural, Residential/ Parkland, Commercial and Industrial Land Uses	Agricultural and Residential/ Parkland Land Uses	Commercial and Industrial Land Uses	Agricultural and Residential/ Parkland Land Uses	Agricultural, Residential/ Parkland, Commercial/ Industrial Land Uses
Polycyclic Aromatic Hydrocarbon (PAH) Results																			
1-Methylnaphthalene	0 05	mg/kg	<0.05	<0.05	<0 05	<0 05	<0.05	<0 05											
2-Methylnaphthalene	0.02		<0.02	<0.02	<0.02	<0 02	<0 02	<0 02		0 0202	0 0202	0.201	0 201						
Acenaphthene	0.00671		<0.00671	<0 00671	<0 00671	<0 00671	<0 00671	<0 00671		0 00671	0.00671	0.0889	0.0889					21.5	0.28
Acenaphthylene	0 005		<0.005	<0.005	<0 005	<0 005	<0 005	<0 005		0 00587	0.00587	0 128	0.128						320
Anthracene	0.04		<0 04	<0 04	<0 04	<0.04	<0 04	<0 04		0.0469	0.0469	0.245	0.245			2 5	3.2	61.5	
Benz(a)anthracene	0.01		<0 01	<0 01	<0 01	<0.01	<0 01	<0 01		0.0371	0.0748	0 385	0.693	0.33				6.2	
Benzo(a)pyrene	0 01		<0 01	<0 01	<0 01	<0.01	<0 01	<0 01		0.0319	0.0888	0.782	0.763	0.37		20	72	0.6	8800
Benzo(b)fluoranthene	0.05		<0.05	<0.05	<0.05	<0 05	<0.05	<0 05										6.2	
Benzo(b+j)fluoranthene	0.1		<0.1	<0.1	<0 1	<0 1	<0 1	<0.1						0 16					
Benzo(g,h,i)perylene	0.01		<0.01	<0 01	<0 01	<0 01	<0.01	<0 01						6.8					
Benzo(j)fluoranthene	Calculation		<0 1	<0 1	<0 1	<0.1	<0.1	<0.1											
Benzo(k)fluoranthene	0.01		<0 01	<0 01	<0 01	<0.01	<0 01	<0.01						0.034				6.2	
Chrysene	0.01		<0 01	<0 01	<0.01	<0.01	<0 01	<0 01		0.0571	0.108	0.862	0.846	2.1				6.2	
Dibenz(a,h)anthracene	0.006		<0.006	<0 006	<0.006	<0 006	<0 006	<0 006		0.00622	0.00622	0.135	0.135	0.23					
Fluoranthene	0 05		<0.05	<0.05	<0 05	<0 05	<0.05	<0 05		0.111	0 113	2.355	1.494			50	180	15.4	
Fluorene	0.02		<0.02	<0 02	<0 02	<0.02	<0 02	<0.02		0 0212	0.0212	0.144	0.144					15 4	0.25
Indeno(1,2,3-cd)pyrene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01						2.7					
Naphthalene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01		0 0346	0 0346	0.391	0.391					8.8	0.013
Perylene	0 05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05											
Phenanthrene	0.04		<0.04	<0.04	<0 04	<0 04	<0 04	<0.04		0.0419	0 0867	0 515	0 544					43	0.046
Pyrene	0.05		<0.05	<0.05	<0 05	<0 05	<0 05	<0 05		0.053	0 153	0.875	1 398					7.7	
Total PAH	0.5		<0 5	<0 5	<0.5	<0 5	<0 5	<0 5	2.5										
Index of Additive Cancer Risk (IACR)	Calculation	None	0.51	0.51	0.51	0 51	0 51	0.51						1					
Benzo(a)pyrene TPE (10^{-5})	Calculation	mg/kg	0.015	0.015	0 015	0.015	0.015	0 015							5 3				
Creosote or Coal Tar source suspected/known?	yes/no		No	No	No	No	No	No											
Uncertainty Factor Applied	yes/no		No	No	No	No	No	No											
Benzo(a)pyrene TPE (10^{-5}) with UF	Calculation	mg/kg	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable							5.3				

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations

Total PAH calculation based on the sum of 16 individual PAH compounds (acenapthene, acenapthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, ideno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and py rene) as per guidance from Environment Canada, 2009.

Additive Cancer Risk (IACR) = ([Benz(a)anthracene]/0 33mg/kg) + ([Benzo(a)pyrene]/0 37mg/kg) + ([Benzo(b+j)fluoranthene]/0 16mg/kg) + ([Benzo(g,h,i)perylene]/6 8mg/kg) + ([Benzo(k)fluoranthene]/0.034mg/kg) + ([Chrysene]/2.1mg/kg) + ([Dibenz(a,h)anthracene]/0.23mg/kg) + ([Indeno(1,2,3-c,d)pyrene]/2.7mg/kg).

Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10^{-5}).

Benzo(a)pyrene TPE (10^{-5}) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Potency Equivalency Factors: ([Benz(a)anthracene]*0 1) + ([Benzo(a)pyrene]*1) + ([Benzo(b+j)fluoranthene]*0.1) + ([Benzo(k)fluoranthene]*0.1) + ([Benzo(g,h,i)perylene]*0.01) + ([Chrysene]*0.01) + ([E

Benzo(a)pyrene TPE Uncertainty Factor = 3.

Light values indicate results below detection limit

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Table B3.2 PAH Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards													
										Sediment Environment		Potable Site						Non-Potable Site					
												Fine-Grained Soil			Coarse-Grained Soil			Fine-Grained Soil			Coarse-Grained Soil		
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8		Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Use	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Uses	Commercial and Industrial Land Uses	Agricultural Land Use	Residential/ Parkland Land Uses	Commercial and Industrial Land Uses
			15 December, 2014																				
Polycyclic Aromatic Hydrocarbon (PAH) Results																							
1-Methylnaphthalene	0.05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	10	0.201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
2-Methylnaphthalene	0.02		<0 02	<0.02	<0 02	<0 02	<0.02	<0 02	10	0 201	0.201	42	42	42	30	30	30	72	72	560	72	72	560
Acenaphthene	0 00671		<0.00671	<0 00671	<0 00671	<0.00671	<0 00671	<0 00671	10	0.0889	0.0889	21 5	5300	8000	21 5	3900	8000	21.5	5300	8000	21 5	3900	8000
Acenaphthylene	0.005		<0 005	<0 005	<0 005	<0.005	<0 005	<0 005	10	0 128	0.128	32	32	32	4.5	4 5	23	33	33	96	4.5	4.5	66
Anthracene	0.04		<0 04	<0.04	<0 04	<0.04	<0 04	<0.04	10	0.245	0.245	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000	2.5	24000	37000
Benz(a)anthracene	0.01		<0.01	<0.01	<0 01	<0 01	<0 01	<0 01	10	0.385	0.693	0.63			0.5			0.63			0.5		
Benzo(a)pyrene	0 01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	0.782	0 763	0.6			0 6			0.6			0.6		
Benzo(b)fluoranthene	0 05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	10	13.4	4.5	6 2			6.2			6.2			6.2		
Benzo(b+j)fluoranthene	0.1		<0 1	<0.1	<0 1	<0 1	<0 1	<0 1															
Benzo(g,h,i)perylene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	3.2	3 2	8.3			6 6			8.3			6.6		
Benzo(j)fluoranthene	Calculation	mg/kg	<0 1	<0 1	<0.1	<0.1	<0.1	<0.1	10	13.4	4.5	6.2			6.2			6.2			6.2		
Benzo(k)fluoranthene	0.01		<0 01	<0 01	<0.01	<0 01	<0 01	<0.01	10	13 4	4.5	6 2			6.2			6.2			6 2		
Chrysene	0.01		<0 01	<0.01	<0 01	<0 01	<0 01	<0 01	10	0.862	0 846	6 2			6 2			6.2			6 2		
Dibenz(a,h)anthracene	0 006		<0 006	<0 006	<0 006	<0.006	<0 006	<0.006	10	0.135	0.135												
Fluoranthene	0.05		<0 05	<0 05	<0.05	<0 05	<0 05	<0 05	10	2.355	1.494	15.4	3500	5300	15.4	3500	5300	15.4	3500	5300	15.4	3500	5300
Fluorene	0.02		<0 02	<0 02	<0.02	<0.02	<0 02	<0.02	10	0 144	0.144	15.4	2700	4100	15.4	2700	4100	15.4	2700	4100	15.4	2700	4100
Indeno(1,2,3-cd)pyrene	0 01		<0 01	<0.01	<0 01	<0 01	<0 01	<0 01	10	3.2	0 88	0.48			0 38			0.48			0.38		
Naphthalene	0.01		<0 01	<0 01	<0 01	<0 01	<0 01	<0 01	10	0.391	0.391	0 75	28	28	0.6	2 2	25	0.75	51	370	0 6	2.2	25
Perylene	0.05		<0 05	<0 05	<0.05	<0 05	<0 05	<0.05	10														
Phenanthrene	0.04		<0 04	<0.04	<0 04	<0 04	<0 04	<0 04	10	0.515	0 544	7.8	17	24	6.2	17	17	7.8			6.2		
Pyrene	0.05		<0 05	<0 05	<0.05	<0 05	<0 05	<0 05	10	0.875	1.398	7 7	2100	3200	7.7	2100	3200	7.7	2100	3200	7 7	2100	3200
Total PAH	0.5		<0 5	<0 5	<0.5	<0.5	<0 5	<0 5	50														
Benzo(a)pyrene TPE (10^{-5})	Calculation	mg/kg	0 015	0 015	0.015	0.015	0 015	0 015				5.3	5.3	5.3	5.3	5.3	5 3	5.3	5.3	5.3	5.3	5.3	5.3
Creosote or Coal Tar source suspected/known?	yes/no		No	No	No	No	No	No															
Uncertainty Factor Applied	yes/no		No	No	No	No	No	No															
Benzo(a)pyrene TPE (10^{-5}) with UF	Calculation	mg/kg	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable				5.3	5.3	5.3	5.3	5.3	5.3	5 3	5.3	5.3	5 3	5 3	5.3

NOTE(S):

Total PAH calculation based on the sum of 16 individual PAH compounds (acenapthene, acenapthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, fluorene, fluoranthene, ideno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) as per guidance from Environment Canada, 2009.

Total Potency Equivalent (TPE) based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10^{-5}).

Benzo(a)pyrene TPE (10^{-5}) = Sum of PAH concentration multiplied by their respective Benzo(a)pyrene Potency Equivalency Factors: ([Benz(a)anthracene]*0.1) + ([Benzo(a)pyrene]*1) + ([Benzo(b+j)fluoranthene]*0.1) + ([Benzo(k)fluoranthene]*0.1) + ([Benzo(g,h,i)perylene]*0.01) + ([Chrysene]*0 01) + ([Dibenz(a,h)anthracene]*1) + ([Indeno(1,2,3-c,d)pyrer

Benzo(a)pyrene TPE Uncertainty Factor = 3.

Light values indicate results below detection limit

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Table B2.3 Metal Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines			
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6		Interim Sediment Quality Guidelines		Probable Effects Levels		Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
			15 December, 2014							Freshwater	Marine	Freshwater	Marine				
Aluminum	10	mg/kg	2150	16400	2790	7140	13500	2860									
Antimony	1		<1	<1	<1	<1	<1	<1						20	20	40	40
Arsenic	1		1	*10*	2	4	*9*	7		5 9	7 24	17 0	41.6	12	12	12	12
Barium	5		64	39	16	66	72	18						750	500	2000	2000
Beryllium	2		<2	<2	<2	<2	<2	<2						4	4	8	8
Boron (Total)	2		3	26	3	26	42	5									
Cadmium	0.3		<0 3	0 3	<0 3	<0.3	<0 3	<0 3	0 6	0 6	0 7	3 5	4 2	1 4	10	22	22
Chromium (Total)	2		3	21	4	11	17	7		37.3	52 3	90.0	160	64	64	87	87
Cobalt	1		2	8	2	5	8	3						40	50	300	300
Copper	2		<2	11	4	7	11	11	81*	35 7	18 7	197	108	63	63	91	91
Iron	50		3540	30100	4350	10200	16800	11700									
Lead	0 5		2 9	19 7	3.1	12.5	20 5	6.4	66*	35 0	30 2	91.3	112	70	140	260	600
Manganese	2		130	350	185	158	295	454									
Mercury (Total)	0 05		<0 05	<0 05	<0 05	<0 05	<0.05	<0 05	0 75	0.17	0.13	0 486	0 7	6.6	6 6	24	50
Molybdenum	2		<2	8	<2	<2	2	3						5	10	40	40
Nickel	2		3	20	5	12	18	7						50	50	50	50
Selenium	1		<1	<1	<1	<1	1	<1						1	1	2.9	2 9
Silver	0 5		<0 5	<0 5	<0 5	<0 5	<0 5	<0 5						20	20	40	40
Strontium	5		7	24	<5	14	29	56									
Thallium	0.1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1						1	1	1	1
Tin	2		2	3	2	2	3	3						5	50	300	300
Uranium	0.1		0 2	3 6	0.2	1.1	1 2	0 3						23	23	33	300
Vanadium	2		4	25	5	15	25	7						130	130	130	130
Zinc	5		16	51	17	35	58	47	160*	123	124	315	271	200	200	360	360

NOTE(S):

Environment Canada, pers comm., June 2002)

Light values indicate results below detection limit

Italicized values indicate exceedance of CCME Interim Sediment Quality Guideline and/or Probable Effects Levels for Freshwater and/or Marine Sediment.

Interupted border values indicate exceedance of CCME Soil Quality Guideline for Agricultural land use applications

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Table B2.4 Metal Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards					
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6		Sediment Environment		Potable and Non-Potable Sites with Coarse- and Fine-Grained Soils			
			15 December, 2014							Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
Aluminum	10	mg/kg	2150	**16400**	2790	7140	13500	2860				15400	15400	15400	198000
Antimony	1		<1	<1	<1	<1	<1	<1	40	25		7.5	7.5	63	63
Arsenic	1		1	10	2	4	9	7	50	17	41.6	17	31	31	31
Barium	5		64	39	16	66	72	18	2000			400	10000	15000	140000
Beryllium	2		<2	<2	<2	<2	<2	<2	8			5	38	320	320
Boron (Total)	2		3	26	3	26	42	5	2			4300	4300	24000	24000
Cadmium	0.3		<0 3	0.3	<0 3	<0 3	<0 3	<0 3	20	3.5	4.2	1.4	14	49	192
Chromium (Total)	2		3	21	4	11	17	7	800	90	160	52	220	630	2300
Cobalt	1		2	8	2	5	8	3	300			20	22	250	250
Copper	2		<2	11	4	7	11	11	500	197	108	63	1100	4000	16000
Iron	50		3540	**30100**	4350	10200	**16800**	**11700**		43766		11000	11000	11000	144000
Lead	0.5		2 9	19 7	3 1	12 5	20 5	6.4	1000	91.3	112	70	140	260	740
Manganese	2		130	350	185	158	295	454		1100					
Mercury (Total)	0 05		<0 05	<0 05	<0 05	<0 05	<0 05	<0.05	10	0.486	0.7	6.6	6 6	24	99
Molybdenum	2		<2	8	<2	<2	2	3	40			40	110	1200	1200
Nickel	2		3	20	5	12	18	7	500	75		50	330	2200	2200
Selenium	1		<1	<1	<1	<1	1	<1	10	2		1	80	125	1135
Silver	0.5		<0 5	<0.5	<0 5	<0 5	<0 5	<0 5	40	1	2.2	20	77	490	490
Strontium	5		7	24	<5	14	29	56				9400	9400	9400	122000
Thallium	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1	1			1	1	1	1
Tin	2		2	3	2	2	3	3	300			5	9400	9400	122000
Uranium	0.1		0 2	3.6	0.2	1.1	1.2	0.3				23	23	33	300
Vanadium	2		4	25	5	15	25	7	200			39	39	160	160
Zinc	5		16	51	17	35	58	47	1500	315	271	200	5600	47000	47000

NOTE(S)

Light values indicate results below detection limit

Yellow highlight indicates exceedance of Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992).

Left justified values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Agricultural land use applications (potable or non-potable sites with fine- or coarse-grained soils)

Bold values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Residential/Parkland land use applications (potable or non-potable sites with fine- or coarse-grained soils).

Underlined values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Commercial land use applications (potable or non-potable sites with fine- or coarse-grained soils)

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Table B2.5 PCB Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines		
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6		Interim Sediment Quality Guidelines		Marine and Estuarine Probable Effects Levels		Agricultural Land Use	Residential/ Parkland Land Use	Commercial/ Industrial Land Use
			15 December, 2014							Freshwater	Marine	Freshwater	Marine			
Polychlorinated Biphenyl (PCB) Results																
Total PCB Concentration	0 022	mg/kg	<0 0215	<0 0215	<0 0215	<0 0215	<0 0215	<0 0215	0.1	0.0341	0.0215	0.277	0.189	0 5	1.3	33

NOTE(S)

Light values indicate results below detection limit

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Table B2.7 Grain Size and Total Organic Carbon Results for Marine Sediments - Transport Canada Caribou Ferry Terminal Inner Channel, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date					
			Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
			15 December, 2014					
Grain Size Results								
< PHI -4 (12.5 mm)	0.1	%	100	100	100	100	100	100
< PHI -3 (9 5 mm)	0.1		100	100	100	100	100	85.6
< PHI -2 (4.75 mm)	0 1		100	100	100	100	100	61.4
< PHI -1 (2 mm)	0.1		97	100	90 2	98 8	100	27.7
< PHI 0 (1 mm)	0.1		92 5	98 7	81.4	98 4	100	15
< PHI +1 (1/2 mm)	0 1		87.8	96 9	60.7	97	99	6 0
< PHI +2 (1/4 mm)	0 1		11 2	92	7.4	84.6	93 2	1.8
< PHI +3 (1/8 mm)	0.1		3 8	86.3	2 7	49.5	79.5	1 4
< PHI +4 (1/16 mm)	0.1		3.4	82.4	2 1	32 6	71.3	1 4
< PHI +5 (1/32 mm)	0.1		2.9	67 5	2	27.3	51 4	1
< PHI +6 (1/64 mm)	0 1		2 5	52.1	1.9	19.8	31 4	0 9
< PHI +7 (1/128 mm)	0.1		2	32.4	0 8	13 0	22 7	0.7
< PHI +8 (1/256 mm)	0.1		2 0	23.5	0 7	9	18.5	0 7
< PHI +9 (1/512 mm)	0 1		1 5	16 1	0.7	2 6	14 0	0.7
Gravel	1		3	<1	10	1	<1	72
Sand	1		94	18	88	66	29	26
Silt	1		1	59	2	24	53	1
Clay	1		2	24	1	9	19	1
Other								
Total Organic Carbon (TOC)	0.15	g/kg	0.17	9.85	0 44	2 25	8 16	1.40

NOTE(S):

Light values indicate results below detection limit

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Table B3.3 Metal Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines			
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8		Interim Sediment Quality Guidelines		Probable Effects Levels		Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
			15 December, 2014							Freshwater	Marine	Freshwater	Marine				
Aluminum	10	mg/kg	13100	18600	3020	3930	18900	17600									
Antimony	1		<1	<1	<1	<1	<1	<1						20	20	40	40
Arsenic	1		*8*	*9*	4	3	*10*	*9*		5 9	7 24	17 0	41 6	12	12	12	12
Barium	5		48	55	156	23	55	55						750	500	2000	2000
Beryllium	2		<2	<2	<2	<2	<2	<2						4	4	8	8
Boron (Total)	2		43	55	5	7	57	44									
Boron (Hot Water Soluble)	0 10		9 2	14 1	1 8	1 7	14 5	17 1									
Cadmium	0 3		<0 3	0 4	<0 3	<0 3	0 4	0 3	0 6	0 6	0 7	3 5	4 2	1 4	10	22	22
Chromium (Hexavalent)	0 4		<0 4	<0 4	<0 4	<0 4	<0 4	<0 4						0 4	0 4	1 4	1 4
Chromium (Total)	2		17	22	7	7	22	21		37 3	52 3	90 0	160	64	64	87	87
Cobalt	1		7	9	3	3	9	9						40	50	300	300
Copper	2		12	12	13	8	12	11	81*	35 7	18 7	197	108	63	63	91	91
Iron	50		17800	31700	12800	8480	33000	31100									
Lead	0 5		18 2	23 8	14 3	7 2	25 3	23 6	66*	35 0	30 2	91 3	112	70	140	260	600
Manganese	2		265	375	570	184	416	368									
Mercury (Total)	0 05		<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	0 75	0 17	0.13	0 486	0 7	6 6	6 6	24	50
Molybdenum	2		4	8	<2	<2	8	6						5	10	40	40
Nickel	2		17	22	7	10	22	21						50	50	50	50
Selenium	1		<1	1	<1	<1	1	1						1	1	2 9	2 9
Silver	0 5		<0 5	<0 5	<0 5	<0 5	<0 5	<0 5						20	20	40	40
Strontium	5		24	21	49	48	25	20									
Thallium	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1						1	1	1	1
Tin	2		3	3	3	3	3	3						5	50	300	300
Uranium	0 1		1 7	3 0	0 6	0 4	2 6	2 4						23	23	33	300
Vanadium	2		22	31	8	10	29	27						130	130	130	130
Zinc	5		62	73	78	58	57	50	160*	123	124	315	271	200	200	360	360

NOTE(S):

Canada, pers comm , June 2002)

Light values indicate results below detection limit

Italicized values indicate exceedance of CCME Interim Sediment Quality Guideline and/or Probable Effects Levels for Freshwater and/or Marine Sediment

Interupted border values indicate exceedance of CCME Soil Quality Guideline for Agricultural land use applications

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Table B3.4 Metal Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards					
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8		Sediment Environment		Potable and Non-Potable Sites with Coarse- and Fine-Grained Soils			
			15 December, 2014							Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
Aluminum	10	mg/kg	13100	**18600**	3020	3930	**18900**	**17600**				15400	15400	15400	198000
Antimony	1		<1	<1	<1	<1	<1	<1	40	25		7.5	7.5	63	63
Arsenic	1		8	9	4	3	10	9	50	17	41.6	17	31	31	31
Barium	5		48	55	156	23	55	55	2000			400	10000	15000	140000
Beryllium	2		<2	<2	<2	<2	<2	<2	8			5	38	320	320
Boron (Total)	2		43	55	5	7	57	44	2			4300	4300	24000	24000
Boron (Hot Water Soluble)	0.10		9.2	14.1	1.8	1.7	14.5	17.1				2			
Cadmium	0.3		<0.3	0.4	<0.3	<0.3	0.4	0.3	20	3.5	4.2	1.4	14	49	192
Chromium (Hexavalent)	0.4		<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	8			0.4	160	1300	1300
Chromium (Total)	2		17	22	7	7	22	21	800	90	160	52	220	630	2300
Cobalt	1		7	9	3	3	9	9	300			20	22	250	250
Copper	2		12	12	13	8	12	11	500	197	108	63	1100	4000	16000
Iron	50		**17800**	**31700**	**12800**	8480	**33000**	**31100**		43766		11000	11000	11000	144000
Lead	0.5		18.2	23.8	14.3	7.2	25.3	23.6	1000	91.3	112	70	140	260	740
Manganese	2		265	375	570	184	416	368		1100					
Mercury (Total)	0.05		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10	0.486	0.7	6.6	6.6	24	99
Molybdenum	2		4	8	<2	<2	8	6	40			40	110	1200	1200
Nickel	2		17	22	7	10	22	21	500	75		50	330	2200	2200
Selenium	1		<1	1	<1	<1	1	1	10	2		1	80	125	1135
Silver	0.5		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	40	1	2.2	20	77	490	490
Strontium	5		24	21	49	48	25	20				9400	9400	9400	122000
Thallium	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1			1	1	1	1
Tin	2		3	3	3	3	3	3	300			5	9400	9400	122000
Uranium	0.1		1.7	3.0	0.6	0.4	2.6	2.4				23	23	33	300
Vanadium	2		22	31	8	10	29	27	200			39	39	160	160
Zinc	5		62	73	78	58	57	50	1500	315	271	200	5600	47000	47000

NOTE(S):

Light values indicate results below detection limit.

Yellow highlight indicates exceedance of Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992).

Left justified values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Agricultural land use applications (potable or non-potable sites with fine- or coarse-grained soils).

Bold values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Residential/Parkland land use applications (potable or non-potable sites with fine- or coarse-grained soils).

Underlined values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Commercial land use applications (potable or non-potable sites with fine- or coarse-grained soils).

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Table B3.5 Metal Results for Leachate Samples - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date					CCME Canadian Water Quality Guidelines for the Protection of Aquatic Life		Health Canada Guidelines for Canadian Drinking Water Quality		Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards			
													Surface Water		Groundwater	
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-6	Car-2014-3-8						Freshwater	Marine	Potable with Fine- and Coarse-Grained Soils	Non-Potable with Fine- and Coarse-Grained Soils
			15 December, 2014					Freshwater	Marine	Maximum Acceptable Concentration	Aesthetic Objective		Agricultural/Residential and Commercial/Industrial Land Uses			
General Chemistry																
pH			7.26	*5.95*	*9.53*	*5.49*	*5.68*	6.5 -9.0	7.0 - 8.7		6.5 - 8.5					
Hardness ($CaCO_3$)	0.7	mg/L	196	236	64.8	224	201									
Sodium	200000	ug/L	*378000*	*471000*	<200000	*445000*	*452000*				200000				200000	
Leachable Metals																
Aluminum	20	ug/L	40	80	120	90	90	5 - 100				500000	5			
Antimony	6		<6	<6	<6	<6	<6			6			20	500	6	
Arsenic	5		<5	<5	<5	5	<5	5	12.5	10		5000	5.0	12.5	10	
Barium	20		<20	30	20	20	20			1000		100000	1000	500	1000	
Beryllium	50		<50	<50	<50	<50	<50					10000	5.3	100	4	
Boron	50		1110	**1960**	120	**2620**	**2020**	1500 - 29000		5000		500000	1200	1200	5000	
Cadmium	0.1		0.1	<0.1	<0.1	<0.1	<0.1	See Notes	0.12	5		500	0.01	0.12	5	
Chromium (Total)	20		<20	<20	<20	<20	<20			50		5000			50	
Cobalt	10		<10	<10	<10	<10	<10					5000	10		10	
Copper	2		**5**	**2**	**4**	<2	<2	See Notes			1000	100000	2	2		
Iron	200		<200	<200	<200	*1300*	300	300			300		300			
Lead	1		<1	<1	<1	<1	<1	See Notes		10		5000	1	2	10	
Manganese	20		<20	*410*	<20	*660*	*340*				50		820			
Molybdenum	20		40	<20	<20	<20	<20	73				500	73		70	
Nickel	20		<20	<20	<20	<20	<20	See Notes				20000	25	8.3	100	
Selenium	1		**9**	**12**	**3**	**12**	**13**	1		50		1000	1.0	2	10	
Silver	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	0.1				5000	0.1	1.5	100	
Strontium	20		230	260	120	270	240						21000		4400	
Thallium	0.8		<0.8	<0.8	<0.8	<0.8	<0.8	0.8					0.8	21.3	2	
Tin	20		<20	<20	<20	<20	<20					300			4400	
Uranium	1		<1	<1	<1	<1	<1	15 - 33		20		2000	300	100	20	
Vanadium	20		<20	<20	<20	<20	<20					10000	6	50	6.2	
Zinc	20		<20	<20	<20	**30**	**20**	30			5000	500000	30	10	5000	

NOTE(S):

Aluminum: CCME CWQG for the Protection of Freshwater Aquatic Life= pH < 6.5 = 5 ug/L; pH ≥ 6.5 = 100 ug/L.

Boron: CCME CWQG for the Protection of Freshwater Aquatic Life = 29000 ug/L (short-term); 1500 ug/L (long-term).

Cadmium: CCME CWQG for the Protection of Freshwater Aquatic Life =

Short-Term: Hardness 50 mg/L = 1.0 ug/L; 0 to < 5.3 mg/L = 0.11 ug/L; ≥ 5.3 to ≤ 360 mg/L = $10^{(1.016[\log10(\text{hardness})]-1.71)}$ ug/L; > 360 mg/L = 7.7 ug/L

Long-Term: Hardness 50 mg/L = 0.09 ug/L; 0 to < 17 mg/L = 0.04 ug/L; ≥ 17 to ≤ 280 mg/L = $10^{(0.83[\log10(\text{hardness})]-2.46)}$ ug/L; > 280 mg/L = 0.37 ug/L

Copper: CCME CWQG for the Protection of Freshwater Aquatic Life = $e^{0.8545[\ln(\text{hardness})]-1.465}$ x 0.2 ug/L; minimum of 2 ug/L.

Lead: CCME CWQG for the Protection of Freshwater Aquatic Life = $e^{1.273[\ln(\text{hardness})]-4.705}$ ug/L; minimum of 1 ug/L.

Nickel: CCME CWQG for the Protection of Freshwater Aquatic Life = $e^{0.76[\ln(\text{hardness})]+1.06}$ ug/L; minimum of 25 ug/L.

Uranium: CCME CWQG for the Protection of Freshwater Aquatic Life = 33 ug/L (short-term); 15 ug/L (long-term).

Yellow highlight indicates exceedance of Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater).

Interupted border values indicate exceedance of Canadian Water Quality Guidelines for the Protection of Aquatic Life (Marine).

Italicized values indicate exceedance of Health Canada Guidelines for Canadian Drinking Water Quality (Maximum Acceptable Concentration and/or Aesthetic Objective).

Left justified values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Surface Water (Freshwater).

Bold values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Surface Water (Marine).

Underlined values indicate exceedance of Nova Scotia Tier 1 Environmental Quality Standards for Groundwater for Agricultural/Residential and Commercial/Industrial land use applications (potable sites with fine- or coarse-grained soils).

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Table B3.6 BTEX/TPH Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations					Reached Baseline at C32	Resemblance	FOC
			Benzene	Toluene	Ethylbenzene	Xylene	C_6-C_{10}	C_{10}-C_{16}	C_{16}-C_{21}	C_{21}-C_{32}	Modified TPH (Less BTEX)			
Car-2014-3-1	15 December, 2014	mg/kg	<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
Car-2014-3-2			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
Car-2014-3-3			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
Car-2014-3-5			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
Car-2014-3-6			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
Car-2014-3-8			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance	
RDL			0.005	0.04	0.01	0.05	3	15		15	20			

Guidelines			Benzene	Toluene	Ethylbenzene	Xylene	Gasoline	Diesel / No. 2 Fuel Oil		No. 6 Oil/ Lube Oil	Modified TPH (Less BTEX)			
Atlantic RBCA Tier I Version 3.0														
Risk-Based Screening Levels for Soil														
Agricultural/ Residential Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	270		1100	1100			
		Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700		10000	10000			
	Non-Potable	Coarse-Grained Soil	0.099	77	30	8.8	74	270		1100	1100			
		Fine-Grained Soil	2.3	10000	9300	210	2100	8600		10000	10000			
Commercial/ Industrial Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	11	870	1800		10000	10000			
		Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700		10000	10000			
	Non-Potable	Coarse-Grained Soil	2.5	10000	10000	110	870	4000		10000	10000			
		Fine-Grained Soil	33	10000	10000	10000	10000	10000		10000	10000			
Residential Saturation		Coarse-Grained Soil	890	450	240	340	TBD	TBD		TBD	TBD			
		Fine-Grained Soil	1000	480	250	360	TBD	TBD		TBD	TBD			
Sediment Ecological Screening Levels for the Protection of Freshwater and Marine Aquatic Life														
Sediment Type (based on Average FOC = 0.02)		Typical	2.4	2.8	2.4	2.6	30	50		86	86			
		Other	10.8	12.2	10	11	134	220		380	380			
CCME Soil Quality Guidelines														
Agricultural, Residential/ Parkland, Commercial, and Industrial Land Uses	Surface	Coarse-Grained Soil	0.03	0.37	0.082	11.0								
		Fine-Grained Soil	0.0068	0.08	0.018	2.4								
	Subsoil	Coarse-Grained Soil	0.03	0.37	0.082	11.0								
		Fine-Grained Soil	0.0068	0.08	0.018	2.4								

NOTE(S):

Fraction of Organic Content (FOC) = g-carbon/g-soil

CCME Soil Quality Guidelines for benzene based on an incremental lifetime cancer risk (ILCR) of 1 in 100,000 (10^{-5}).

Light values indicate results below detection limit.

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Table B3.7 BTEX/TPH Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Sample ID	Date	Units	BTEX Concentrations				Petroleum Hydrocarbon Fraction Concentrations					Reached Baseline at C32	Resemblance
			Benzene	Toluene	Ethylbenzene	Xylene	C_6-C_{10}	C_{10}-C_{16}	C_{16}-C_{21}	C_{21}-C_{32}	Modified TPH (Less BTEX)		
Car-2014-3-1	15 December, 2014	mg/kg	<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
Car-2014-3-2			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
Car-2014-3-3			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
Car-2014-3-5			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
Car-2014-3-6			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
Car-2014-3-8			<0.005	<0.04	<0.01	<0.05	<3	<15		<15	<20	Yes	No Resemblance
RDL			0.005	0.04	0.01	0.05	3	15		15	20		
Guidelines			**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**Gasoline**	**Diesel / No. 2 Fuel Oil**		**No. 6 Oil/ Lube Oil**	**Modified TPH (Less BTEX)**		
Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)													
			5	30	50	50							
Nova Scotia Tier 1 Environmental Quality Standards													
Sediment													
Sediment Environment		Freshwater	1.2	1.4	1.2	1.3	15	25		43	43		
		Marine	1.2	1.4	1.2	1.3	15	25		43	43		
Soils													
Agricultural Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	150		300	300		
		Fine-Grained Soil	0.094	0.74	0.13	22	210	150		1300	1300		
	Non-Potable	Coarse-Grained Soil	0.99	75	30	8.8	74	150		300	300		
		Fine-Grained Soil	2.3	10000	120	65	210	150		1300	1300		
Residential/ Parkland Land Use	Potable	Coarse-Grained Soil	0.042	0.35	0.065	8.8	74	270		1100	1100		
		Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700		10000	10000		
	Non-Potable	Coarse-Grained Soil	0.99	77	30	8.8	74	270		1100	1100		
		Fine-Grained Soil	2.3	10000	9300	210	2100	8600		10000	10000		
Commercial and Industrial Land Uses	Potable	Coarse-Grained Soil	0.042	0.35	0.065	11	870	1800		10000	10000		
		Fine-Grained Soil	0.094	0.74	0.13	22	1900	4700		10000	10000		
	Non-Potable	Coarse-Grained Soil	2.5	10000	10000	110	870	4000		10000	10000		
		Fine-Grained Soil	33	10000	10000	10000	10000	10000		10000	10000		

NOTE(S):

Light values indicate results below detection limit.

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Table B3.8 PCB and DDT Results for Marine Sediments as Compared to Federal Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						CEPA Disposal at Sea Screening Criteria - Lower Level	CCME Sediment Quality Guidelines				CCME Soil Quality Guidelines		
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8		Interim Sediment Quality Guidelines		Marine and Estuarine Probable Effects Levels		Agricultural Land Use	Residential/ Parkland Land Use	Commercial/ Industrial Land Use
			15 December, 2014							Freshwater	Marine	Freshwater	Marine			
Polychlorinated Biphenyl (PCB) Results																
Aroclor 1016	0 1	mg/kg	<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1221	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1232	0.1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1242	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1248	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1254	0.0633		<0 0633	<0 0633	<0 0633	<0 0633	<0 0633	<0 0633		0 060	0.0633	0.340	0.709			
Aroclor 1260	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1262	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Aroclor 1268	0 1		<0 1	<0 1	<0 1	<0 1	<0 1	<0 1								
Dieldrin	0 0007		<0 0007	<0 0007	<0 0007	<0 0007	<0 0007	<0 0007		0 00285	0 00071	0.00667	0 0043			
Total PCB Concentration	0 0215		<0.0215	<0 0215	<0 0215	<0 0215	<0 0215	<0 0215	0.1	0 0341	0 0215	0 277	0.189	0.5	1 3	33
Dichloro-Diphenyl-Trichloroethane (DDT) Results																
o,p-DDE	0.001	mg/kg	<0 001	<0 001	<0 001	<0 001	<0 001	<0.001								
p,p-DDE	0.001		<0 001	<0 001	<0 001	<0 001	<0 001	<0 001								
o,p-DDD	0 001		<0.001	<0 001	<0 001	<0 001	<0 001	<0 001								
p,p-DDD	0 001		<0 001	<0 001	<0 001	<0 001	<0.001	<0 001								
o,p-DDT	0 001		<0 001	<0 001	<0 001	<0 001	<0.001	<0.001								
p,p-DDT	0 001		<0 001	<0 001	<0 001	<0 001	<0 001	<0.001								
o,p-DDT + p,p-DDT	0.001		<0 001	<0 001	<0 001	<0 001	<0 001	<0 001		0.00119	0 00119	0 00477	0 00477			
o,p-DDD +p,p-DDD	0.001		<0 001	<0 001	<0 001	<0 001	<0 001	<0 001		0 00354	0 00122	0.00851	0 00781			
o,p-DDE + p,p-DDE	0.001		<0 001	<0 001	<0 001	<0 001	<0.001	<0 001		0 00142	0 00207	0.00675	0 37400			
Total DDT (calculated)	0 001		<0 001	<0 001	<0 001	<0 001	<0 001	<0 001						0.7	0.7	12

NOTE(S):

Light values indicate results below detection limit

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Table B3.9 PCB and DDT Results for Marine Sediments as Compared to Provincial Criteria - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date						Nova Scotia Guidelines for Disposal of Contaminated Solids in Landfills (1992)	Nova Scotia Tier 1 Environmental Quality Standards															
										Sediment Environment		Potable Site								Non-Potable Site				
												Fine-Grained Soils				Coarse-Grained Soils				Fine-Grained Soils	Coarse-Grained Soils	Fine- and Coarse-Grained Soils		
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8																	
			15 December, 2014							Freshwater	Marine	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use	Agricultural Land Use	Agricultural Land Use	Residential/ Parkland Land Use	Commercial Land Use	Industrial Land Use
Polychlorinated Biphenyl (PCB) Results																									
Aroclor 1016	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1221	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1232	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1242	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1248	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1254	0.0633		<0.0633	<0.0633	<0.0633	<0.0633	<0.0633	<0.0633																	
Aroclor 1260	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1262	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Aroclor 1268	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1																	
Dieldrin	0.0007		<0.0007	<0.0007	<0.0007	<0.0007	<0.0007	<0.0007		0.00667	0.0043	0.055	0.59	0.59	0.59	0.044	1.1	1.1	1.1	0.055	0.044	3.4	5.1	44
Total PCB Concentration	0.0215		<0.0215	<0.0215	<0.0215	<0.0215	<0.0215	<0.0215	50	0.277	0.189	1.3	22	33	33	1.3	22	33	33	1.3	1.3	22	33	33
Dichloro-Diphenyl-Trichloroethane (DDT) Results																									
o,p-DDE	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
p,p-DDE	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
o,p-DDD	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
p,p-DDD	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
o,p-DDT	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
p,p-DDT	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
o,p-DDT + p,p-DDT	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
o,p-DDD +p,p-DDD	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
o,p-DDE + p,p-DDE	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001																	
Total DDT (calculated)	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		0.00477	0.00477	0.7	220	340	1600	0.7	220	340	1600	0.7	0.7	220	340	1600

NOTE(S):

Light values indicate results below detection limit.

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Table B3.10 Grain Size and Carbon Content Results for Marine Sediments - Transport Canada Caribou Ferry Terminal Berth, Pictou County, Nova Scotia

Parameter	RDL	Units	Sample Identification and Date					
			Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
			15 December, 2014					
Grain Size Results								
< PHI -4 (12 5 mm)	0 1	%	100	100	100	100	100	100
< PHI -3 (9.5 mm)	0 1		100	100	100	88 2	100	100
< PHI -2 (4 75 mm)	0 1		100	100	36 2	74.2	100	100
< PHI -1 (2 mm)	0.1		92 4	96 1	7.7	40.3	97 5	97
< PHI 0 (1 mm)	0.1		87.4	93.2	3.6	15.4	93	95.8
< PHI +1 (1/2 mm)	0 1		82.8	91.4	2.1	4 2	91.6	94 8
< PHI +2 (1/4 mm)	0 1		73 2	89.2	1 8	3 1	88.8	90 9
< PHI +3 (1/8 mm)	0.1		67 4	85 8	1.8	2.9	84 5	86 7
< PHI +4 (1/16 mm)	0.1		63 5	84 6	1 8	2.9	82 4	84 2
< PHI +5 (1/32 mm)	0.1		58.5	76 1	1.6	2.7	75 4	72.6
< PHI +6 (1/64 mm)	0 1		44.1	57.4	1.6	2 7	57 4	58.3
< PHI +7 (1/128 mm)	0.1		32.1	41.5	0.8	2 0	42.4	41 5
< PHI +8 (1/256 mm)	0 1		23 4	30 9	0 7	1 5	32 6	29 7
< PHI +9 (1/512 mm)	0.1		15 7	6.2	0 6	1 2	18 6	16.6
Gravel	1		8	4	92	60	3	3
Sand	1		29	12	6	37	15	13
Silt	1		40	54	1	1	50	55
Clay	1		23	31	1	2	33	30
Other								
Total Organic Carbon (TOC)	0.15	g/kg	2.63	4 3	0 55	0 65	10 3	9.31
Total Inorganic Caron (TIC)	0.15	g/kg	<0 15	<0 15	<0 15	<0 15	<0 15	<0 15
Total Carbon (TC)	Calculation	g/kg	2 71	4 38	0.63	0 73	10 38	9 39

NOTE(S):

All results below the laboratory detection limit were divided by 2 prior to further calculations

Light values indicate results below detection limit

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amec foster wheeler

APPENDIX C
QA/QC, COC, and Laboratory Certificates of Analyses

s.19(1)

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CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
580 MAIN STREET, SUITE 105
SAINT JOHN, NB E2K1J5
(506) 652-9497

ATTENTION TO:

PROJECT: TV141220 (Berth, IC & OC)

AGAT WORK ORDER: 14X929293

SOIL ANALYSIS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

TRACE ORGANICS REVIEWED BY: Jason Coughtrey, Inorganics Supervisor

DATE REPORTED: Feb 10, 2015

PAGES (INCLUDING COVER): 34

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at

*NOTES
VERSION 3:Final Report, including EC GIS upload, Grain Size Graph and additional analysis for SPLP Metals, issued, February 10, 2015
Version 2: Error in Versions, not applicable
Version 1 Complete Report including re-analysis for Zinc on sample Car-2014-3-3, issued January 9, 2015

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Available Metals in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

SAMPLE DESCRIPTION:				Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8	Car-2014-2-1	Car-2014-2-2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886	6191892	6191908
Aluminum	mg/kg		10	13100	18600	3020	3930	18900	17600	2150	16400
Antimony	mg/kg		1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/kg		1	8	9	4	3	10	9	1	10
Barium	mg/kg		5	48	55	156	23	55	55	64	39
Beryllium	mg/kg		2	<2	<2	<2	<2	<2	<2	<2	<2
Boron	mg/kg		2	43	55	5	7	57	44	3	26
Cadmium	mg/kg		0 3	<0.3	0 4	<0 3	<0.3	0 4	0 3	<0.3	0 3
Chromium	mg/kg		2	17	22	7	7	22	21	3	21
Cobalt	mg/kg		1	7	9	3	3	9	9	2	8
Copper	mg/kg		2	12	12	13	8	12	11	<2	11
Iron	mg/kg		50	17800	31700	12800	8480	33000	31100	3540	30100
Lead	mg/kg		0.5	18 2	23.8	14 3	7 2	25.3	23 6	2 9	19 7
Lithium	mg/kg		5	31	42	9	11	44	42	6	43
Manganese	mg/kg		2	265	375	570	184	416	368	130	350
Molybdenum	mg/kg		2	4	8	<2	<2	8	6	<2	8
Nickel	mg/kg		2	17	22	7	10	22	21	3	20
Selenium	mg/kg		1	<1	1	<1	<1	1	1	<1	<1
Silver	mg/kg		0 5	<0.5	<0.5	<0 5	<0 5	<0 5	<0.5	<0.5	<0 5
Strontium	mg/kg		5	24	21	49	48	25	20	7	24
Thallium	mg/kg		0.1	<0 1	<0 1	<0 1	<0 1	<0.1	<0 1	<0.1	<0.1
Tin	mg/kg		2	3	3	3	3	3	3	2	3
Uranium	mg/kg		0 1	1.7	3 0	0.6	0 4	2.6	2 4	0.2	3.6
Vanadium	mg/kg		2	22	31	8	10	29	27	4	25
Zinc	mg/kg		5	62	73	1100	58	57	50	16	51

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Available Metals in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191913	6191920	6191925	6191930
Aluminum	mg/kg		10	2790	7140	13500	2860
Antimony	mg/kg		1	<1	<1	<1	<1
Arsenic	mg/kg		1	2	4	9	7
Barium	mg/kg		5	16	66	72	18
Beryllium	mg/kg		2	<2	<2	<2	<2
Boron	mg/kg		2	3	26	42	5
Cadmium	mg/kg		0 3	<0 3	<0.3	<0.3	<0.3
Chromium	mg/kg		2	4	11	17	7
Cobalt	mg/kg		1	2	5	8	3
Copper	mg/kg		2	4	7	11	11
Iron	mg/kg		50	4350	10200	16800	11700
Lead	mg/kg		0.5	3 1	12.5	20 5	6.4
Lithium	mg/kg		5	9	22	33	8
Manganese	mg/kg		2	185	158	295	454
Molybdenum	mg/kg		2	<2	<2	2	3
Nickel	mg/kg		2	5	12	18	7
Selenium	mg/kg		1	<1	<1	1	<1
Silver	mg/kg		0 5	<0 5	<0.5	<0 5	<0 5
Strontium	mg/kg		5	<5	14	29	56
Thallium	mg/kg		0.1	<0.1	<0 1	<0.1	<0 1
Tin	mg/kg		2	2	2	3	3
Uranium	mg/kg		0 1	0 2	1 1	1.2	0.3
Vanadium	mg/kg		2	5	15	25	7
Zinc	mg/kg		5	17	35	58	47

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6191844-6191930 Results are based on the dry weight of the sample.

Certified By: Jason Coughlan

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Hexavalent Chromium in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Chromium, Hexavalent	mg/kg		0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - SPLP Leachable Metals

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191880	6191886
Aluminum Leachate	mg/L		0.02	0 04	0 08	0 12	0 09	0.09
Antimony Leachate	mg/L		0.006	<0.006	<0 006	<0 006	<0 006	<0 006
Arsenic Leachate	mg/L		0 005	<0 005	<0 005	<0.005	0 005	<0 005
Barium Leachate	mg/L		0 02	<0 02	0 03	0 02	0 02	0 02
Beryllium Leachate	mg/L		0.05	<0.05	<0 05	<0.05	<0.05	<0 05
Bismuth Leachate	mg/L		0 02	<0 02	<0 02	<0 02	<0 02	<0.02
Boron Leachate	mg/L		0.05	1 11	1.96	0.12	2.62	2 02
Cadmium Leachate	mg/L		0.0001	0 0001	<0.0001	<0 0001	<0 0001	<0 0001
Chromium Leachate	mg/L		0 02	<0 02	<0.02	<0.02	<0 02	<0 02
Cobalt Leachate	mg/L		0 01	<0.01	<0 01	<0 01	<0.01	<0 01
Copper Leachate	mg/L		0.002	0 005	0.002	0.004	<0 002	<0.002
Iron Leachate	mg/L		0.2	<0 2	<0 2	<0 2	1 3	0.3
Lead Leachate	mg/L		0.001	<0 001	<0 001	<0.001	<0 001	<0.001
Lithium Leachate	mg/L		0.02	<0 02	0.02	<0.02	0.02	0.02
Magnesium Leachate	mg/L		0.05	32.0	41 9	7 91	41 5	38.0
Manganese Leachate	mg/L		0 02	<0 02	0.41	<0.02	0 66	0.34
Molybdenum Leachate	mg/L		0.02	0 04	<0 02	<0 02	<0 02	<0 02
Nickel Leachate	mg/L		0.02	<0 02	<0 02	<0.02	<0 02	<0.02
Selenium Leachate	mg/L		0.001	0.009	0 012	0 003	0.012	0 013
Silver Leachate	mg/L		0 0001	<0.0001	<0 0001	<0 0001	<0 0001	<0 0001
Sodium Leachate	mg/L		200	378	471	<200	445	452
Strontium Leachate	mg/L		0 02	0 23	0 26	0 12	0.27	0.24
Thallium Leachate	mg/L		0 0008	<0 0008	<0 0008	<0.0008	<0.0008	<0.0008
Tin Leachate	mg/L		0 02	<0 02	<0 02	<0 02	<0 02	<0 02
Uranium Leachate	mg/L		0 001	<0 001	<0 001	<0 001	<0 001	<0.001
Vanadium Leachate	mg/L		0 02	<0 02	<0 02	<0 02	<0 02	<0 02
Zinc Leachate	mg/L		0 02	<0 02	<0.02	<0 02	0.03	0 02
Initial pH	NA		NA	NA	NA	NA	NA	NA
Final pH	NA		NA	7 26	5.95	9 53	5 49	5 68
% Moisture	%			42 44	50.36	18	49 93	50 31

Certified By:

Results relate only to the items tested and to all the items tested

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - SPLP Leachable Metals

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191880	6191886
Total Sample Mass	g			43 49	50.37	30.58	49.99	50.38
Hardness	mg/L		0 7	196	236	64.8	224	201
Calcium Leachate	mg/L		0.05	25 9	25 4	12.9	21 3	17 7

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - TOC Only

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-2-1	Car-2014-2-2	Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6	Car-2014-1-1	Car-2014-1-2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191892	6191908	6191913	6191920	6191925	6191930	6191936	6191937
Total Organic Carbon by Walkley Black	%		0 15	0 17	9 85	0 44	2.25	8.16	1.40	<0.15	0.35

		SAMPLE DESCRIPTION:		Car-2014-1-3
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		12/15/2014
Parameter	Unit	G / S	RDL	6191939
Total Organic Carbon by Walkley Black	%		0.15	<0 15

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

Certified By:

Results relate only to the items tested and to all the items tested

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - TOC/TIC

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Total Organic Carbon by Walkley Black	%		0 15	2 63	4 30	0.55	0 65	10.3	9 31
Total Inorganic Carbon, Calculated	%		0 15	<0 15	<0 15	<0.15	<0 15	<0 15	<0.15

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Available Metals in Soil - Zinc Re-Analysis only

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

			SAMPLE DESCRIPTION:	Car-2014-3-3
			SAMPLE TYPE:	Soil
			DATE SAMPLED:	12/15/2014
Parameter	Unit	G / S	RDL	6191855
Zinc	mg/kg		5	78

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

6191855 *Results are based on the dry weight of the sample*

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Boron (HWE) (Soil)

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Boron (Hot Water Soluble)	µg/g		1 0	9.2	14 1	1 8	1.7	14 5	17 1

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard Refers to T1(All)

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

SAMPLE DESCRIPTION:				Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8	Car-2014-2-1	Car-2014-2-2
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
DATE SAMPLED:				12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886	6191892	6191908
Particle Size Distribution (<12.5mm, -4 PHI)	%		0.1	100	100	100	100	100	100	100	100
Particle Size Distribution (<9.5mm, -3 PHI)	%		0.1	100	100	100	88 2	100	100	100	100
Particle Size Distribution (<4.75mm, -2 PHI	%		0 1	100	100	36 2	74 2	100	100	100	100
Particle Size Distribution (<2mm, -1 PHI)	%		0 1	92 4	96 1	7 7	40 3	97 5	97.0	97.0	100
Particle Size Distribution (<1mm, 0 PHI)	%		0.1	87.4	93 2	3.6	15 4	93 0	95 8	92.5	98.7
Particle Size Distribution (<1/2mm, 1 PHI)	%		0.1	82 8	91.4	2 1	4.2	91 6	94 8	87.8	96.9
Particle Size Distribution (<1/4mm, 2 PHI)	%		0 1	73 2	89 2	1 8	3.1	88.8	90.9	11.2	92 0
Particle Size Distribution (<1/8mm, 3 PHI)	%		0 1	67.4	85 8	1 8	2.9	84 5	86 7	3 8	86 3
Particle Size Distribution (<1/16mm, 4 PHI)	%		0 1	63.5	84.6	1 8	2 9	82 4	84.2	3 4	82.4
Particle Size Distribution (<1/32mm, 5 PHI)	%		0.1	58.5	76 1	1.6	2.7	75 4	72 6	2 9	67.5
Particle Size Distribution (<1/64mm, 6 PHI)	%		0.1	44 1	57.4	1.6	2 7	57.4	58 3	2 5	52 1
Particle Size Distribution (<1/128mm, 7 PHI)	%		0 1	32 1	41 5	0 8	2.0	42 4	41.5	2 0	32 4
Particle Size Distribution (<1/256mm, 8 PHI)	%		0 1	23.4	30 9	0.7	1 5	32 6	29 7	2 0	23 5
Particle Size Distribution (<1/512mm, 9 PHI)	%		0.1	15 7	6.2	0.6	1 2	18 6	16 6	1.5	16.1
Particle Size Distribution (Gravel)	%		1	8	4	92	60	3	3	3	<1
Particle Size Distribution (Sand)	%		1	29	12	6	37	15	13	94	18
Particle Size Distribution (Silt)	%		1	40	54	1	1	50	55	1	59
Particle Size Distribution (Clay)	%		1	23	31	1	2	33	30	2	24
Particles >75um	%		1	35	15	98	97	17	15	97	17
Classification	Coarse/Fine			Fine	Fine	Coarse	Coarse	Fine	Fine	Coarse	Fine

Certified By:

Results relate only to the items tested and to all the items tested

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

Certified By:

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PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6	Car-2014-1-1	Car-2014-1-2	Car-2014-1-3
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191913	6191920	6191925	6191930	6191936	6191937	6191939
Particle Size Distribution (<12 5mm, -4 PHI)	%		0 1	100	100	100	100	100	100	100
Particle Size Distribution (<9.5mm, -3 PHI)	%		0.1	100	100	100	85.6	100	100	100
Particle Size Distribution (<4.75mm, -2 PHI	%		0.1	100	100	100	61 4	100	100	100
Particle Size Distribution (<2mm, -1 PHI)	%		0 1	90 2	98 8	100	27 7	98 5	100	100
Particle Size Distribution (<1mm, 0 PHI)	%		0.1	81.4	98 4	100	15 0	89 4	100	100
Particle Size Distribution (<1/2mm, 1 PHI)	%		0 1	60.7	97 0	99.0	6 0	36 1	97.5	97.5
Particle Size Distribution (<1/4mm, 2 PHI)	%		0.1	7 4	84.6	93 2	1 8	2 6	13.4	13 6
Particle Size Distribution (<1/8mm, 3 PHI)	%		0.1	2 7	49 5	79 5	1 4	1 7	1.8	2 0
Particle Size Distribution (<1/16mm, 4 PHI)	%		0 1	2.1	32 6	71 3	1.4	1 7	1 3	1 7
Particle Size Distribution (<1/32mm, 5 PHI)	%		0 1	2.0	27 3	51 4	1 0	1 6	1 3	1 6
Particle Size Distribution (<1/64mm, 6 PHI)	%		0.1	1 9	19.8	31 4	0 9	1.5	1 3	1 4
Particle Size Distribution (<1/128mm, 7 PHI)	%		0 1	0 8	13 0	22 7	0 7	1.5	1 3	0 4
Particle Size Distribution (<1/256mm, 8 PHI)	%		0 1	0 7	9 0	18.5	0 7	1 3	1 2	0.4
Particle Size Distribution (<1/512mm, 9 PHI)	%		0 1	0.7	2 6	14 0	0.7	1 3	1 1	0 4
Particle Size Distribution (Gravel)	%		1	10	1	<1	72	2	<1	<1
Particle Size Distribution (Sand)	%		1	88	66	29	26	97	99	98
Particle Size Distribution (Silt)	%		1	2	24	53	1	<1	<1	1
Particle Size Distribution (Clay)	%		1	1	9	19	1	1	1	<1
Particles >75um	%		1	98	63	27	99	98	99	98
Classification	Coarse/Fine			Coarse	Coarse	Coarse	Coarse	Coarse	Coarse	Coarse

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Grain Size Analysis (Sieve & Pipette)

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Mercury Analysis in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8	Car-2014-2-1	Car-2014-2-2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886	6191892	6191908
Mercure	mg/kg		0 05	<0.05	<0.05	<0 05	<0.05	<0 05	<0 05	<0.05	<0.05

		SAMPLE DESCRIPTION:		Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191913	6191920	6191925	6191930
Mercure	mg/kg		0.05	<0 05	<0 05	<0 05	<0 05

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

6191844-6191930 Results are based on the dry weight of the soil

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Arochlors Only

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Aroclor 1242	mg/kg		0.1	<0.1	<0 1	<0.1	<0.1	<0.1	<0 1
Aroclor 1248	mg/kg		0.1	<0.1	<0 1	<0 1	<0.1	<0 1	<0.1
Aroclor 1254	mg/kg		0 0633	<0.0633	<0 0633	<0.0633	<0.0633	<0 0633	<0 0633
Aroclor 1260	mg/kg		0 1	<0 1	<0.1	<0 1	<0 1	<0.1	<0 1
Aroclor 1016	mg/kg		0 1	<0.1	<0 1	<0.1	<0 1	<0.1	<0 1
Aroclor 1221	mg/kg		0.1	<0.1	<0 1	<0.1	<0 1	<0 1	<0 1
Aroclor 1232	mg/kg		0.1	<0 1	<0 1	<0.1	<0.1	<0 1	<0.1
Aroclor 1262	mg/kg		0.1	<0 1	<0 1	<0.1	<0.1	<0 1	<0 1
Aroclor 1268	mg/kg		0 1	<0.1	<0 1	<0.1	<0 1	<0.1	<0 1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6191844-6191886 Results are based on the dry weight of the soil

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Atlantic RBCA Tier 1 Hydrocarbons in Soil + Silica Gel + Creosote

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Benzene	mg/kg		0.005	<0 005	<0 005	<0 005	<0.005	<0 005	<0 005
Toluene	mg/kg		0.04	<0.04	<0 04	<0 04	<0 04	<0 04	<0 04
Ethylbenzene	mg/kg		0.01	<0 01	<0 01	<0 01	<0 01	<0 01	<0.01
Xylene (Total)	mg/kg		0.05	<0.05	<0 05	<0 05	<0.05	<0.05	<0 05
C6-C10 (less BTEX)	mg/kg		3	<3	<3	<3	<3	<3	<3
>C10-C21 Hydrocarbons	mg/kg		15	<15	<15	<15	<15	<15	<15
>C21-C32 Hydrocarbons	mg/kg		15	<15	<15	<15	<15	<15	<15
Modified TPH (Tier 1)	mg/kg		20	<20	<20	<20	<20	<20	<20
Resemblance Comment				NR	NR	NR	NR	NR	NR
Creosote Comment				NR	NR	NR	NR	NR	NR
Return to Baseline at C32				Y	Y	Y	Y	Y	Y
% Moisture	%		1	42	50	18	16	50	50
Silica Gel Cleanup				y	y	y	y	y	y
Surrogate	**Unit**	**Acceptable Limits**							
Isobutylbenzene - EPH	%	60-140		87	108	129	107	121	95
Isobutylbenzene - VPH	%	60-140		82	85	91	87	84	87
n-Dotriacontane - EPH	%	60-140		81	104	115	98	130	86

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6191844-6191886 Results are based on the dry weight of the soil

Resemblance Comment Key
GF - Gasoline Fraction
WGF - Weathered Gasoline Fraction
GR - Product in Gasoline Range
FOF - Fuel Oil Fraction
WFOF - Weathered Fuel Oil Fraction
FR - Product in Fuel Oil Range
LOF - Lube Oil Fraction
UC - Unidentified Compounds
NR - No Resemblance
NA - Not Applicable

Certified By:

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - DDT in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886
Dieldrin (Hfx 2012-03)	µg/kg		0 7	<0 7	<0 7	<0 7	<0 7	<0.7	<0 7
o,p'-DDD (Hfx 2012-03)	µg/kg		1.0	<1 0	<1 0	<1.0	<1 0	<1.0	<1.0
o,p'-DDE (Hfx 2012-03)	µg/kg		1 0	<1 0	<1 0	<1.0	<1.0	<1.0	<1.0
o,p'-DDT (Hfx 2012-03)	µg/kg		1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
p,p'-DDD (Hfx 2012-03)	µg/kg		1.0	<1.0	<1.0	<1 0	<1.0	<1 0	<1 0
p,p'-DDE (Hfx 2012-03)	µg/kg		1.0	<1 0	<1 0	<1 0	<1 0	<1 0	<1 0
p,p'-DDT (Hfx 2012-03)	µg/kg		1.0	<1 0	<1.0	<1 0	<1.0	<1 0	<1.0
o,p'-DDT + p,p'-DDT	µg/kg		1.0	<1 0	<1 0	<1 0	<1 0	<1.0	<1.0
o,p'-DDD + p,p'-DDD	ug/kg		1 0	<1 0	<1.0	<1 0	<1 0	<1 0	<1 0
o,p'-DDE + p,p'-DDE	µg/kg		1 0	<1 0	<1 0	<1.0	<1 0	<1 0	<1 0
Total DDT	µg/kg		1 0	<1 0	<1 0	<1.0	<1 0	<1.0	<1 0

Comments: *RDL - Reported Detection Limit; G / S - Guideline / Standard*

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293
PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
ATTENTION TO:
SAMPLING SITE:
SAMPLED BY:

AMEC - NB - Polycyclic Aromatic Hydrocarbons in Soil

DATE RECEIVED: 2014-12-17 **DATE REPORTED: 2015-02-10**

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8	Car-2014-2-1	Car-2014-2-2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886	6191892	6191908
1-Methylnaphthalene	mg/kg		0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0.05
2-Methylnaphthalene	mg/kg		0.02	<0 02	<0.02	<0.02	<0 02	<0 02	<0.02	<0 02	<0 02
Acenaphthene	mg/kg		0.00671	<0.00671	<0.00671	<0.00671	<0 00671	<0.00671	<0 00671	<0 00671	<0 00671
Acenaphthylene	mg/kg		0 005	<0.005	<0 005	<0 005	<0 005	<0 005	<0.005	<0.005	<0 005
Acridine	mg/Kg		0 05	<0 05	<0 05	<0 05	<0.05	<0 05	<0 05	<0 05	<0 05
Anthracene	mg/kg		0 04	<0.04	<0.04	<0 04	<0 04	<0 04	<0.04	<0 04	<0 04
Benzo(a)anthracene	mg/kg		0 01	<0 01	<0 01	<0 01	<0 01	<0 01	<0.01	<0 01	<0 01
Benzo(a)pyrene	mg/kg		0.01	<0 01	<0.01	<0.01	<0.01.	<0 01	<0.01	<0 01	<0.01
Benzo(b)fluoranthene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(b+j)fluoranthene	mg/kg		0 1	<0.1	<0.1	<0 1	<0 1	<0.1	<0.1	<0.1	<0 1
Benzo(e)pyrene	mg/kg		0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0 05	<0.05
Benzo(ghi)perylene	mg/kg		0 01	<0 01	<0 01	<0 01	<0.01	<0.01	<0.01	<0.01	<0 01
Benzo(k)fluoranthene	mg/kg		0.01	<0 01	<0 01	<0 01	<0.01	<0 01	<0.01	<0.01	<0 01
Chrysene	mg/kg		0.01	<0.01	<0 01	<0.01	<0.01	<0 01	<0 01	<0.01	<0.01
Dibenzo(a,h)anthracene	mg/kg		0.006	<0 006	<0 006	<0 006	<0.006	<0.006	<0.006	<0.006	<0 006
Fluoranthene	mg/kg		0.05	<0.05	<0.05	<0 05	<0 05	<0.05	<0 05	<0 05	<0 05
Fluorene	mg/kg		0 02	<0 02	<0 02	<0 02	<0 02	<0 02	<0 02	<0 02	<0 02
Indeno(1,2,3)pyrene	mg/kg		0.01	<0 01	<0.01	<0 01	<0.01	<0 01	<0.01	<0 01	<0.01
Naphthalene	mg/kg		0.01	<0 01	<0 01	<0 01	<0.01	<0 01	<0 01	<0.01	<0 01
Perylene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0 05	<0 05	<0.05
Phenanthrene	mg/kg		0 04	<0 04	<0.04	<0.04	<0.04	<0.04	<0 04	<0 04	<0.04
Pyrene	mg/kg		0 05	<0.05	<0.05	<0.05	<0 05	<0.05	<0 05	<0.05	<0 05
Quinoline	mg/Kg		0.05	<0 05	<0 05	<0 05	<0.05	<0 05	<0.05	<0.05	<0 05
Total PAH	mg/Kg		0.5	<0 5	<0 5	<0 5	<0 5	<0.5	<0 5	<0.5	<0.5
% Moisture	%			42	50	18	17	50	50	21	50
Surrogate	**Unit**	**Acceptable Limits**									
Nitrobenzene-d5	%	50-140		115	120	105	107	114	103	112	114
2-Fluorobiphenyl	%	50-140		92	98	91	88	99	98	96	95
Terphenyl-d14	%	50-140		77	92	85	84	89	96	91	91

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Polycyclic Aromatic Hydrocarbons in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191913	6191920	6191925	6191930
1-Methylnaphthalene	mg/kg		0.05	<0 05	<0 05	<0 05	<0.05
2-Methylnaphthalene	mg/kg		0.02	<0 02	<0.02	<0 02	<0 02
Acenaphthene	mg/kg		0 00671	<0 00671	<0.00671	<0 00671	<0.00671
Acenaphthylene	mg/kg		0.005	<0 005	<0 005	<0 005	<0 005
Acridine	mg/Kg		0 05	<0.05	<0 05	<0.05	<0 05
Anthracene	mg/kg		0 04	<0 04	<0 04	<0 04	<0.04
Benzo(a)anthracene	mg/kg		0.01	<0 01	<0 01	<0 01	<0 01
Benzo(a)pyrene	mg/kg		0 01	<0 01	<0.01	<0 01	<0 01
Benzo(b)fluoranthene	mg/kg		0 05	<0 05	<0.05	<0 05	<0 05
Benzo(b+j)fluoranthene	mg/kg		0 1	<0 1	<0 1	<0 1	<0 1
Benzo(e)pyrene	mg/kg		0.05	<0.05	<0.05	<0.05	<0.05
Benzo(ghi)perylene	mg/kg		0.01	<0 01	<0 01	<0.01	<0.01
Benzo(k)fluoranthene	mg/kg		0 01	<0 01	<0 01	<0 01	<0 01
Chrysene	mg/kg		0 01	<0.01	<0.01	<0 01	<0 01
Dibenzo(a,h)anthracene	mg/kg		0 006	<0 006	<0 006	<0 006	<0 006
Fluoranthene	mg/kg		0.05	<0 05	<0 05	<0.05	<0 05
Fluorene	mg/kg		0.02	<0 02	<0 02	<0 02	<0 02
Indeno(1,2,3)pyrene	mg/kg		0 01	<0 01	<0.01	<0 01	<0.01
Naphthalene	mg/kg		0 01	<0.01	<0.01	<0 01	<0.01
Perylene	mg/kg		0 05	<0.05	<0 05	<0 05	<0 05
Phenanthrene	mg/kg		0.04	<0 04	<0 04	<0 04	<0 04
Pyrene	mg/kg		0 05	<0.05	<0 05	<0.05	<0 05
Quinoline	mg/Kg		0 05	<0 05	<0 05	<0.05	<0 05
Total PAH	mg/Kg		0 5	<0 5	<0.5	<0 5	<0.5
% Moisture	%			17	40	59	23
Surrogate	**Unit**	**Acceptable Limits**					
Nitrobenzene-d5	%	50-140		109	108	111	118
2-Fluorobiphenyl	%	50-140		94	90	99	93
Terphenyl-d14	%	50-140		93	95	95	104

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Polycyclic Aromatic Hydrocarbons in Soil

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6191844-6191930 Results are based on the dry weight of the soil.

Certified By:

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Certificate of Analysis

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

AMEC - NB - Total Polychlorinated Biphenyls

DATE RECEIVED: 2014-12-17

DATE REPORTED: 2015-02-10

		SAMPLE DESCRIPTION:		Car-2014-3-1	Car-2014-3-2	Car-2014-3-3	Car-2014-3-5	Car-2014-3-6	Car-2014-3-8	Car-2014-2-1	Car-2014-2-2
		SAMPLE TYPE:		Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191844	6191850	6191855	6191874	6191880	6191886	6191892	6191908
Total Polychlorinated Biphenyls	mg/kg		0.0215	<0.0215	<0 0215	<0 0215	<0.0215	<0.0215	<0 0215	<0.0215	<0.0215

		SAMPLE DESCRIPTION:		Car-2014-2-3	Car-2014-2-4	Car-2014-2-5	Car-2014-2-6
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		12/15/2014	12/15/2014	12/15/2014	12/15/2014
Parameter	Unit	G / S	RDL	6191913	6191920	6191925	6191930
Total Polychlorinated Biphenyls	mg/kg		0 0215	<0 0215	<0.0215	<0.0215	<0 0215

Comments: RDL - Reported Detection Limit, G / S - Guideline / Standard

6191844-6191930 Results are based on the dry weight of the soil

Certified By: Jason Coughlin

Results relate only to the items tested and to all the items tested

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Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO: [redacted]

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Feb 10, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
AMEC - NB - Available Metals in Soil															
Aluminum	1222201		10900	10500	3 7%	< 10	120%	80%	120%	120%	80%	120%	NA	70%	130%
Antimony	1222201		< 1	< 1	0 0%	< 1	80%	80%	120%	81%	80%	120%	NA	70%	130%
Arsenic	1222201		9	9	0 0%	< 1	105%	80%	120%	104%	80%	120%	NA	70%	130%
Barium	1222201		72	70	2 8%	< 5	80%	80%	120%	80%	80%	120%	NA	70%	130%
Beryllium	1222201		< 2	< 2	0 0%	< 2	120%	80%	120%	120%	80%	120%	NA	70%	130%
Boron	1222201		42	41	2 4%	< 2	96%	80%	120%	104%	80%	120%	NA	70%	130%
Cadmium	1222201		< 0 3	< 0 3	0 0%	< 0 3	85%	80%	120%	88%	80%	120%	NA	70%	130%
Chromium	1222201		17	17	0 0%	< 2	105%	80%	120%	120%	80%	120%	NA	70%	130%
Cobalt	1222201		8	7	13 3%	< 1	92%	80%	120%	90%	80%	120%	NA	70%	130%
Copper	1222201		11	10	9 5%	< 2	91%	80%	120%	90%	80%	120%	NA	70%	130%
Iron	1222201		16800	16400	2 4%	< 50	98%	80%	120%	101%	80%	120%	NA	70%	130%
Lead	1222201		20.5	20 3	1.0%	< 0 5	118%	80%	120%	120%	80%	120%	NA	70%	130%
Lithium	1222201		33	32	3.1%	< 5	120%	70%	130%	120%	70%	130%	NA	70%	130%
Manganese	1222201		295	289	2 1%	< 2	103%	80%	120%	101%	80%	120%	NA	70%	130%
Molybdenum	1222201		2	2	0 0%	< 2	102%	80%	120%	97%	80%	120%	NA	70%	130%
Nickel	1222201		18	18	0.0%	< 2	96%	80%	120%	90%	80%	120%	NA	70%	130%
Selenium	1222201		1	1	0 0%	< 1	101%	80%	120%	112%	80%	120%	NA	70%	130%
Silver	1222201		< 0 5	< 0 5	0 0%	< 0 5	99%	80%	120%	99%	80%	120%	NA	70%	130%
Strontium	1222201		29	28	3 5%	< 5	100%	80%	120%	100%	80%	120%	NA	70%	130%
Thallium	1222201		< 0.1	< 0 1	0 0%	< 0 1	116%	80%	120%	114%	80%	120%	NA	70%	130%
Tin	1222201		3	3	0 0%	< 2	85%	80%	120%	80%	80%	120%	NA	70%	130%
Uranium	1222201		1 2	1 2	0 0%	< 0.1	119%	80%	120%	120%	80%	120%	NA	70%	130%
Vanadium	1222201		25	24	4 1%	< 2	103%	80%	120%	99%	80%	120%	NA	70%	130%
Zinc	1222201		58	48	18 9%	< 5	85%	80%	120%	86%	80%	120%	NA	70%	130%
Mercury Analysis in Soil															
Mercure	6191913	6191913	<0.05	<0 05	NR	< 0 2	99%	80%	120%	117%	80%	120%	112%	70%	130%
AMEC - NB - TOC/TIC															
Total Organic Carbon by Walkley Black	7004	1939	<0 15	<0 15	NA	< 0.15	99%	80%	120%	NA	80%	120%	95%	80%	120%
Boron (HWE) (Soil)															
Boron (Hot Water Soluble)	6202410		0 41	0 41	0 0%	< 0 10	72%	60%	140%	93%	70%	130%	96%	60%	140%
Soil Analysis - Total Organic Carbon (W-B Wet Oxidation)															
Total Organic Carbon	7004	1939	< 0.15	< 0 15	0 0%	< 0 15	99%	80%	120%				94%	80%	120%

Comments If Matrix spike value is NA, the spiked analyte concentration was lower than that of the matrix contribution
If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated

Available Metals in Soil - Zinc Re-Analysis only

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Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

Soil Analysis (Continued)

RPT Date. Feb 10, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Zinc	9		78	39	66 7%	< 5	93%	80%	120%		80%	120%		70%	130%
AMEC - NB - SPLP Leachable Metals															
Aluminum Leachate	2052015	6191886	0.09	0 09	0 0%	< 0.02	115%	80%	120%	112%	80%	120%	107%	70%	130%
Antimony Leachate	2052015	6191886	< 0 006	< 0.006	0.0%	< 0 006	96%	80%	120%	99%	80%	120%	99%	70%	130%
Arsenic Leachate	2052015	6191886	< 0 005	< 0 005	0 0%	< 0 005	98%	80%	120%	94%	80%	120%	100%	70%	130%
Barium Leachate	2052015	6191886	0 02	0 02	0 0%	< 0 02	100%	80%	120%	100%	80%	120%	100%	70%	130%
Beryllium Leachate	2052015	6191886	< 0 05	< 0 05	0.0%	< 0 05	120%	80%	120%	120%	80%	120%	114%	70%	130%
Bismuth Leachate	2052015	6191886	< 0.02	< 0.02	0 0%	< 0.02	106%	80%	120%	93%	80%	120%	91%	70%	130%
Boron Leachate	2052015	6191886	2 02	1 99	1.5%	< 0 05	120%	80%	120%	111%	80%	120%	85%	70%	130%
Cadmium Leachate	2052015	6191886	< 0 0001	< 0 0001	0.0%	< 0 0001	99%	80%	120%	100%	80%	120%	97%	70%	130%
Chromium Leachate	2052015	6191886	< 0 02	< 0.02	0 0%	< 0 02	105%	80%	120%	110%	80%	120%	103%	70%	130%
Cobalt Leachate	2052015	6191886	< 0 01	< 0.01	0 0%	< 0 01	112%	80%	120%	106%	80%	120%	130%	70%	130%
Copper Leachate	2052015	6191886	< 0 002	< 0.002	0 0%	< 0 002	111%	80%	120%	106%	80%	120%	106%	70%	130%
Iron Leachate	2052015	6191886	0 31	0 37	17 6%	< 0 2	107%	80%	120%	109%	80%	120%	106%	70%	130%
Lead Leachate	2052015	6191886	< 0.001	< 0 001	0 0%	< 0.001	110%	80%	120%	106%	80%	120%	102%	70%	130%
Lithium Leachate	2052015	6191886	0 02	0.02	0 0%	< 0 02	120%	80%	120%	120%	80%	120%	124%	70%	130%
Magnesium Leachate	2052015	6191886	38.0	40 1	5 4%	< 0.05	105%	80%	120%	107%	70%	130%	90%	70%	130%
Manganese Leachate	2052015	6191886	0 34	0 34	0 0%	< 0 02	107%	80%	120%	111%	80%	120%	93%	70%	130%
Molybdenum Leachate	2052015	6191886	< 0 02	< 0 02	0.0%	< 0 02	102%	80%	120%	98%	80%	120%	100%	70%	130%
Nickel Leachate	2052015	6191886	< 0.02	< 0 02	0.0%	< 0 02	112%	80%	120%	105%	80%	120%	102%	70%	130%
Selenium Leachate	2052015	6191886	0.013	0 013	0.0%	< 0 001	100%	80%	120%	99%	80%	120%	100%	70%	130%
Silver Leachate	2052015	6191886	< 0 0001	< 0.0001	0 0%	< 0 0001	102%	80%	120%	99%	80%	120%	89%	70%	130%
Sodium Leachate	2052015	6191886	46500000	46500000	0 0%	< 200	104%	80%	120%	105%	80%	120%	100%	70%	130%
Strontium Leachate	2052015	6191886	0 24	0.23	4 3%	< 0.02	102%	80%	120%	102%	80%	120%	90%	70%	130%
Thallium Leachate	2052015	6191886	< 0.0008	< 0 0008	0.0%	< 0 0008	104%	80%	120%	102%	80%	120%	98%	70%	130%
Tin Leachate	2052015	6191886	< 0.02	< 0 02	0 0%	< 0 02	99%	80%	120%	101%	80%	120%	99%	70%	130%
Uranium Leachate	2052015	6191886	< 0.001	< 0 001	0 0%	< 0.001	106%	80%	120%	106%	80%	120%	105%	70%	130%
Vanadium Leachate	2052015	6191886	< 0.02	< 0 02	0 0%	< 0 02	114%	80%	120%	110%	80%	120%	111%	70%	130%
Zinc Leachate	2052015	6191886	0 02	0 05		< 0.02	110%	80%	120%	111%	80%	120%	109%	70%	130%

Certified By:

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Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO: [redacted]

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date. Feb 10, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
AMEC - NB - DDT in Soil															
Dieldrin (Hfx 2012-03)	1		< 0 7	< 0 7	0 0%	< 0 7	101%	60%	130%	106%	70%	130%	100%	60%	130%
o,p'-DDD (Hfx 2012-03)	1		< 1 0	< 1.0	0 0%	< 1 0	98%	60%	130%	90%	70%	130%	124%	60%	130%
o,p'-DDE (Hfx 2012-03)	1		< 1 0	< 1.0	0 0%	< 1 0	104%	60%	130%	73%	70%	130%	82%	60%	130%
o,p'-DDT (Hfx 2012-03)	1		< 1.0	< 1 0	0.0%	< 1 0	100%	60%	130%	105%	70%	130%	84%	60%	130%
p,p'-DDD (Hfx 2012-03)	1		< 1.0	< 1 0	0.0%	< 1 0	111%	60%	130%	105%	70%	130%	88%	60%	130%
p,p'-DDE (Hfx 2012-03)	1		< 1 0	< 1 0	0.0%	< 1 0	100%	60%	130%	111%	70%	130%	89%	60%	130%
p,p'-DDT (Hfx 2012-03)	1		< 1.0	< 1 0	0 0%	< 1 0	82%	60%	130%	74%	70%	130%	77%	60%	130%
AMEC - NB - Atlantic RBCA Tier 1 Hydrocarbons in Soil + Silica Gel + Creosote															
Benzene	1	6191850	< 0 005	< 0 005	0 0%	< 0 005	64%	60%	140%	64%	60%	140%	71%	30%	130%
Toluene	1	6191850	< 0.04	< 0 04	0 0%	< 0 04	64%	60%	140%	63%	60%	140%	60%	30%	130%
Ethylbenzene	1	6191850	< 0.01	< 0 01	0 0%	< 0 01	65%	60%	140%	63%	60%	140%	64%	30%	130%
Xylene (Total)	1	6191850	< 0 05	< 0.05	0 0%	< 0 05	68%	60%	140%	67%	60%	140%	61%	30%	130%
C6-C10 (less BTEX)	1	6191850	< 3	< 3	0 0%	< 3	81%	60%	140%	73%	60%	140%	77%	30%	130%
>C21-C32 Hydrocarbons	1	6191880	<15	<15	0.0%	< 15	80%	60%	140%	84%	60%	140%	NA	30%	130%
AMEC - NB - Polycyclic Aromatic Hydrocarbons in Soil															
1-Methylnaphthalene	1	6191908	< 0 05	< 0 05	0.0%	< 0 05	71%	50%	140%	121%	50%	140%	90%	50%	140%
2-Methylnaphthalene	1	6191908	< 0.02	< 0 02	0.0%	< 0 02	125%	50%	140%	125%	50%	140%	80%	50%	140%
Acenaphthene	1	6191908	< 0 00671	< 0 00671	0 0%	< 0.00671	108%	50%	140%	124%	50%	140%	123%	50%	140%
Acenaphthylene	1	6191908	< 0.005	< 0 005	0 0%	< 0.005	113%	50%	140%	117%	50%	140%	112%	50%	140%
Acridine	1	6191908	< 0.05	< 0 05	0 0%	< 0 05	61%	50%	140%	101%	50%	140%	108%	50%	140%
Anthracene	1	6191908	< 0 04	< 0 04	0.0%	< 0.04	107%	50%	140%	84%	50%	140%	128%	50%	140%
Benzo(a)anthracene	1	6191908	< 0 01	< 0 01	0.0%	< 0 01	71%	50%	140%	110%	50%	140%	112%	50%	140%
Benzo(a)pyrene	1	6191908	< 0.01	< 0 01	0 0%	< 0.01	61%	50%	140%	114%	50%	140%	72%	50%	140%
Benzo(b)fluoranthene	1	6191908	< 0 05	< 0 05	0.0%	< 0 05	107%	50%	140%	79%	50%	140%	72%	50%	140%
Benzo(b+j)fluoranthene	1	6191908	< 0.1	< 0 1	0 0%	< 0 1	77%	50%	140%	77%	50%	140%	73%	50%	140%
Benzo(e)pyrene	1	6191908	< 0.05	< 0 05	0 0%	< 0 05	96%	50%	140%	99%	50%	140%	70%	50%	140%
Benzo(ghi)perylene	1	6191908	< 0.01	< 0.01	0 0%	< 0 01	96%	50%	140%	109%	50%	140%	77%	50%	140%
Benzo(k)fluoranthene	1	6191908	< 0 01	< 0 01	0.0%	< 0.01	59%	50%	140%	64%	50%	140%	70%	50%	140%
Chrysene	1	6191908	< 0.01	< 0 01	0 0%	< 0 01	82%	50%	140%	127%	50%	140%	130%	50%	140%
Dibenzo(a,h)anthracene	1	6191908	< 0 006	< 0 006	0.0%	< 0.006	72%	50%	140%	111%	50%	140%	102%	50%	140%
Fluoranthene	1	6191908	< 0 05	< 0 05	0 0%	< 0 05	112%	50%	140%	133%	50%	140%	112%	50%	140%
Fluorene	1	6191908	< 0 02	< 0.02	0 0%	< 0 02	113%	50%	140%	107%	50%	140%	103%	50%	140%
Indeno(1,2,3)pyrene	1	6191908	< 0.01	< 0 01	0.0%	< 0 01	82%	50%	140%	95%	50%	140%	73%	50%	140%
Naphthalene	1	6191908	< 0 01	< 0 01	0.0%	< 0.01	136%	50%	140%	108%	50%	140%	68%	50%	140%
Perylene	1	6191908	< 0.05	< 0.05	0 0%	< 0 05	89%	50%	140%	88%	50%	140%	90%	50%	140%
Phenanthrene	1	6191908	< 0.04	< 0.04	0 0%	< 0 04	131%	50%	140%	115%	50%	140%	130%	50%	140%
Pyrene	1	6191908	< 0.05	< 0.05	0 0%	< 0 05	110%	50%	140%	126%	50%	140%	105%	50%	140%
Quinoline	1	6191908	< 0.05	< 0.05	0 0%	< 0 05	109%	50%	140%	101%	50%	140%	87%	50%	140%

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc (CALA) for specific drinking water tests *Accreditations are location and parameter specific* A complete listing of parameters for each location is available from www cala ca and/or www scc ca The tests in this report may not necessarily be included in the scope of accreditation

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Quality Assurance

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL
PROJECT: TV141220 (Berth, IC & OC)
SAMPLING SITE:

AGAT WORK ORDER: 14X929293
ATTENTION TO:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 10, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
AMEC - NB - Total Polychlorinated Biphenyls															
Total Polychlorinated Biphenyls	1	6191892	< 0 0215	< 0 0215	0 0%	< 0 0215	113%	70%	130%	80%	60%	130%	77%	60%	130%
Comments If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated															
AMEC NWT Polychlorinated Biphenyls Analysis in Soil															
Aroclor 1242	199	6191850	<0 05	<0.05	NA	< 0 03	96%	70%	130%	120%	70%	130%	120%	50%	150%
Comments If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated															
AMEC NWT Polychlorinated Biphenyls Analysis in Soil															
Aroclor 1242	199	6191844	< 0 03	< 0 03	NA	< 0 03	96%	70%	130%	120%	70%	130%	120%	50%	150%
Total Polychlorinated Biphenyls	199	6191844	< 0 03	< 0.03	NA	< 0 03	101%	70%	130%	118%	70%	130%	118%	50%	150%
Aroclor 1254	199	6191844	< 0.03	< 0 03	NA	< 0 03	105%	70%	130%	105%	70%	130%	105%	60%	140%
Aroclor 1260	199	6191844	< 0.03	< 0 03	NA	< 0 03	102%	70%	130%	128%	70%	130%	128%	60%	140%
Comments If the RPD value is NA, the results of the duplicates are under 5X the RDL and will not be calculated															

Certified By:

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Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Aluminum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Antimony	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Arsenic	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Barium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Beryllium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Boron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cadmium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Chromium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Cobalt	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Copper	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Iron	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Lead	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP-MS
Lithium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP-MS
Manganese	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Molybdenum	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Nickel	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Selenium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Silver	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Strontium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Thallium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Tin	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Uranium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Vanadium	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Zinc	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Chromium, Hexavalent	INOR-121-6029	SSSA 5;25 p 683	SPECTROPHOTOMETER
Aluminum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Antimony Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Arsenic Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS

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Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Barium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Beryllium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Bismuth Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Boron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cadmium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Chromium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Cobalt Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Copper Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Iron Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lead Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Lithium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Magnesium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Manganese Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Molybdenum Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Nickel Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Selenium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Silver Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Sodium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Strontium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Thallium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Tin Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Uranium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Vanadium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Zinc Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/SM1325 In-house leachate	ICP-MS
Initial pH	MET-121-6108		pH METER
Final pH	MET-121-6108		pH METER
% Moisture			GRAVIMETRIC
Total Sample Mass			
Hardness		SM 2340B	CALCULATION
Calcium Leachate	MET-121-6108, MET-121-6105	EPA SW-846 6020A/1311 SM1325	ICP-MS

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AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO:

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PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Total Organic Carbon by Walkley Black	SOIL 0480; SOIL 0110, SOIL 0120	NELSON 1996, SHEPPARD 2007	SPECTROPHOTOMETER
Total Organic Carbon by Walkley Black	SOIL 0480, SOIL 0110, SOIL 0120	NELSON 1996, SHEPPARD 2007	SPECTROPHOTOMETER
Total Inorganic Carbon, Calculated			CALCULATION
Zinc	MET-121-6105 & MET-121-6103	EPA SW 846 6020A/3050B & SM 3125	ICP/MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Particle Size Distribution (<12 5mm, -4 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<9.5mm, -3 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<4.75mm, -2 PHI	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<2mm, -1 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1mm, 0 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/2mm, 1 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/4mm, 2 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/8mm, 3 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/16mm, 4 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/32mm, 5 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/64mm, 6 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/128mm, 7 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/256mm, 8 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (<1/512mm, 9 PHI)	INOR-121-6034	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Gravel)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Sand)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Silt)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particle Size Distribution (Clay)	INOR-121-6031	ASTM D-422-63	SIEVE & PIPETTE
Particles >75um	INOR-121-6031, INOR-121-6034	ASTM D-422-63	CALCULATED
Classification	INOR-121-6031, INOR-121-6031	Atlantic RBCA	CALCULATED
Mercure	MET-161-6107F	EPA 245 5	VAPEUR FROIDE/AA
Total Organic Carbon	SOIL 0480, SOIL 0110, SOIL 0120	NELSON 1996, SHEPPARD 2007	COLOR

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Trace Organics Analysis			
Aroclor 1242	TO 0400	EPA 8082	GC/ECD
Aroclor 1248	TO 0400	EPA 8082	GC/ECD
Aroclor 1254	TO 0400	EPA 8082	GC/ECD
Aroclor 1260	TO 0400	EPA 8082	GC/ECD
Aroclor 1016	TO 0400	EPA 8082	GC/ECD
Aroclor 1221	TO 0400	EPA 8082	GC/ECD
Aroclor 1232	TO 0400	EPA 8082	GC/ECD
Aroclor 1262	TO 0400	EPA 8082	GC/ECD
Aroclor 1268	TO 0400	EPA 8082	GC/ECD
Benzene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Toluene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Ethylbenzene	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
Xylene (Total)	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
C6-C10 (less BTEX)	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
>C10-C21 Hydrocarbons	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
>C21-C32 Hydrocarbons	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Modified TPH (Tier 1)	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Resemblance Comment	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS/FID
Creosote Comment			GC/FID
Return to Baseline at C32	ORG-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
% Moisture	LAB-131-4024	Topp, G C 1993. Soil Water Content CSSS	GRAVIMETRIC
Silica Gel Cleanup			GC/FID
Isobutylbenzene - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Isobutylbenzene - VPH	VOL-120-5013	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/MS
n-Dotriacontane - EPH	VOL-120-5007	Atlantic RBCA Guidelines for Laboratories Tier 1	GC/FID
Dieldrin (Hfx 2012-03)	ORG-120-5108		GC/ECD
o,p'-DDD (Hfx 2012-03)	ORG-120-5108		GC/ECD
o,p'-DDE (Hfx 2012-03)	ORG-120-5108		GC/ECD
o,p'-DDT (Hfx 2012-03)	ORG-120-5108		GC/ECD
p,p'-DDD (Hfx 2012-03)	ORG-120-5108		GC/ECD
p,p'-DDE (Hfx 2012-03)	ORG-120-5108		GC/ECD
p,p'-DDT (Hfx 2012-03)	ORG-120-5108		GC/ECD
o,p'-DDT + p,p'-DDT	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
o,p'-DDD + p,p'-DDD	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
o,p'-DDE + p,p'-DDE	ORG-120-5108	Based on EPA SW-846/6510 C-8080-8081 A	GC/ECD
Total DDT	Calculation	Calculation	GC/FID

Results relate only to the items tested and to all the items tested

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AGAT Laboratories

11 Morris Drive, Unit 122
Dartmouth, Nova Scotia
CANADA B3B 1M2
TEL (902)468-8718
FAX (902)468-8924
http //www agatlabs com

Method Summary

CLIENT NAME: AMEC EARTH AND ENVIRONMENTAL

AGAT WORK ORDER: 14X929293

PROJECT: TV141220 (Berth, IC & OC)

ATTENTION TO:

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Methylnaphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acenaphthylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Acridine	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(a)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(b)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(b+j)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(e)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(ghi)perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Benzo(k)fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Chrysene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Dibenzo(a,h)anthracene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluoranthene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Fluorene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Indeno(1,2,3)pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Naphthalene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Perylene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Phenanthrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Pyrene	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Quinoline	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Total PAH			
% Moisture			GRAVIMETRIC
Nitrobenzene-d5	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
2-Fluorobiphenyl	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Terphenyl-d14	ORG-120-5104	EPA SW846/3541/3510/8270C	GC/MS
Total Polychlorinated Biphenyls	ORG-120-5106	EPA SW846/8081/8080	GC/ECD
Aroclor 1242	TO 0410	EPA 8082	GC/ECD
Aroclor 1016	TO 0400	EPA 8082	GC/ECD
Aroclor 1221	TO 0400	EPA 8082	GC/ECD
Aroclor 1232	TO 0400	EPA 8082	GC/ECD
Total Polychlorinated Biphenyls	TO 0410	EPA 8082	GC/ECD
Aroclor 1248	TO 0400	EPA 8082	GC/ECD
Aroclor 1254	TO 0400	EPA 8082	GC/ECD
Decachlorobiphenyl	TO 0410	EPA 8082	GC/ECD
Aroclor 1262	TO 0400	EPA 8082	GC/ECD
Aroclor 1260	TO 0400	EPA 8082	GC/ECD
Aroclor 1268	TO 0400	EPA 8082	GC/ECD

Results relate only to the items tested and to all the items tested

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B3B 1M2
http://webearth.agatlabs.com

Phone: 902-468-8718
Fax: 902-468-8924
www.agatlabs.com

Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes') 14x929293
Arrival Temperature: 4° AGAT Job Number:
Notes:

Drinking Water Sample (y/n): N Reg. No.
Waterworks Number:

Report To:
Company: AMEC
Contact:
Address: 105-580 Main St, Hilyard Place - Bldg B
Saint John, NB, E2K 1J5
Phone: FAX:
PO#:
AGAT Quotation: 14-1380
Client Project #: TV141220 (Berth)

Invoice to: Same (Y/N) - Circle
Company:
Contact:
Address:
Phone: Fax:
PO#/Credit Card #:

Report Information
1. Name:
Email:
2. Name:
Email:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☒ Do Not List Guidelines on Report
☐ PIRI Site Info (check all that apply): ☐ Pot. ☐ Coarse ☐ N/Pot. ☐ Fine
☐ Tier 1 ☐ Res. ☐ Com
☐ Tier 2
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other

Report Format
☐ Single PDF sample per page
☐ Multiple PDF samples per page
☐ Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT: ☒ 5 - 7 days
Rush TAT: ☐ 1 day ☐ 2 days ☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Hot Water Boron (Miss.)	Available Metals(w Sn,Se-LL)	Hexavalent Chromium	Mercury	PSA - Sieve & Pipette	TOC	TIC	DDT	Silica Gel Cleanup	TPH/BTEX (PIRI) Tier 1	Total PAH	Total PCB's (Calculation)	PCB Arochlors-1242,1248,1254,1260 (Miss)	PCB Arochlors-1016,1221,1232,1262,1268 (Cal)	Extract and Hold for Potential BTEX/VPH Leachate (Perform Extraction on December 22, 2014)	Extract and Hold for Potential PAH Leachate (Perform Extraction on December 29, 2014)	Extract and Hold for Potential EPH Leachate (Perform Extraction on December 29, 2014)	Lab Sample #
Car-2014-3-1	15-Dec-14	sed./soi	5 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Car-2014-3-2	15-Dec-14	sed./soi	5 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Car-2014-3-3	15-Dec-14	sed./soi	2 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Car-2014-3-5	15-Dec-14	sed./soi	5 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Car-2014-3-6	15-Dec-14	sed./soi	5 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Car-2014-3-8	15-Dec-14	sed./soi	5 x 500 ml	marine sediment		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Special Instructions
Connors Diving	17-Dec-14	Tim Daccord	10:40	Please include a qualitative comment regarding the presence of creosote in samples as well as provide the results in GIS-ready format.
Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Page 1 of 3
		Tim Daccord	17 Dec 14	

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B3B 1M2
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Phone: 902-468-8718
Fax: 902-468-8924
www.agatlabs.com

Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes')
Arrival Temperature: 4°
AGAT Job Number: 14x929293
Notes:

Drinking Water Sample (y/n): N Reg. No.
Waterworks Number:

Report To:
Company: AMEC
Contact:
Address: 105-580 Main St, Hilyard Place - Bldg B
Saint John, NB, E2K 1J5
Phone: FAX:
PO#:
AGAT Quotation: 14-1380
Client Project #: TV141220 (IC)

Invoice to: Same (Y/N) = Circle
Company:
Contact:
Address:
Phone: Fax:
PO#/Credit Card #:

Report Information
1. Name:
Email:
2. Name:
Email:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☒ Do Not List Guidelines on Report
☐ PIRI
Site Info (check all that apply)
☐ Tier 1 ☐ Res. ☐ Pot. ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot. ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other

Report Format
☐ Single PDF sample per page
☐ Multiple PDF samples per page
☐ Excel Format Included

Turnaround Time (TAT) Business Days
Regular TAT:
☒ 5 - 7 days
Rush TAT:
☐ 1 day ☐ 2 days
☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Hot Water Boron (Mass.)	Available Metals(w Sn,Se-LL)	Hexavalent Chromium	Mercury	PSA - Sieve & Pipette	TOC (Cal)	TIC (Mining)	DDT	Silica Gel Cleanup	TPH/BTEX (PIR) Tier 1	Total PAH	Total PCB's (Calculation)	PCB Aroclors - 1242,1248,1254,1260 (Cal)	PCB Aroclors - 1016,1221,1232,1262,1268 (Cal)	PAH Leachate (Perform Extraction on December 29)					Lab Sample #
Car-2014-2-1	15-Dec-14	sed./sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					
Car-2014-2-2	15-Dec-14	sed./sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					
Car-2014-2-3	15-Dec-14	sed./sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					
Car-2014-2-4	15-Dec-14	sed./sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					
Car-2014-2-5	15-Dec-14	sed /sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					
Car-2014-2-6	15-Dec-14	sed./sol	5 x 500 ml	marine sediment			X		X	X	X					X	X			X					

Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Special Instructions
Connors Diving	17-Dec-14	Tina Daniel	10:40	Please provide the results in GIS-ready format.
Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	
		Tina Daniel	17-Dec-14	Page 2 of 3

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http://webearth.agatlabs.com

Phone. 902-468-8718
Fax: 902-468-8924
www.agatlabs.com

Laboratory use Only
Arrival Condition: ☐ Good ☐ Poor (complete 'notes')
Arrival Temperature: HP AGAT Job Number: 14x929293
Notes:

Drinking Water Sample (y/n): N Reg. No.
Waterworks Number:

Report To:
Company: AMEC
Contact:
Address: 105-580 Main St, Hilyard Place - Bldg B
Saint John, NB, E2K 1J5
Phone: FAX:
PO#:
AGAT Quotation: 14-1380
Client Project #: TV141220 (OC)

Invoice to: Same (Y/N) - Circle
Company:
Contact:
Address:
Phone: Fax
PO#/Credit Card #:

Report Information
1. Name:
Email:
2. Name:
Email:

Regulatory Requirements (Check):
☐ List Guidelines on Report ☒ Do Not List Guidelines on Report
☐ PIRI
Site Info (check all that apply)
☐ Tier 1 ☐ Res. ☐ Pot. ☐ Coarse
☐ Tier 2 ☐ Com ☐ N/Pot. ☐ Fine
☐ Gas ☐ Fuel ☐ Lube
☐ CCME ☐ CDWQ
☐ Ind ☐ NSDFOSP
☐ Com ☐ HRM 101
☐ Res/P Storm Water
☐ Ag ☐ HRM 101
☐ FWAL Waste Water
☐ Sediment
☐ Other

Report Format
☐ Single PDF sample per page
☐ Multiple PDF samples per page
☐ Excel Format Included

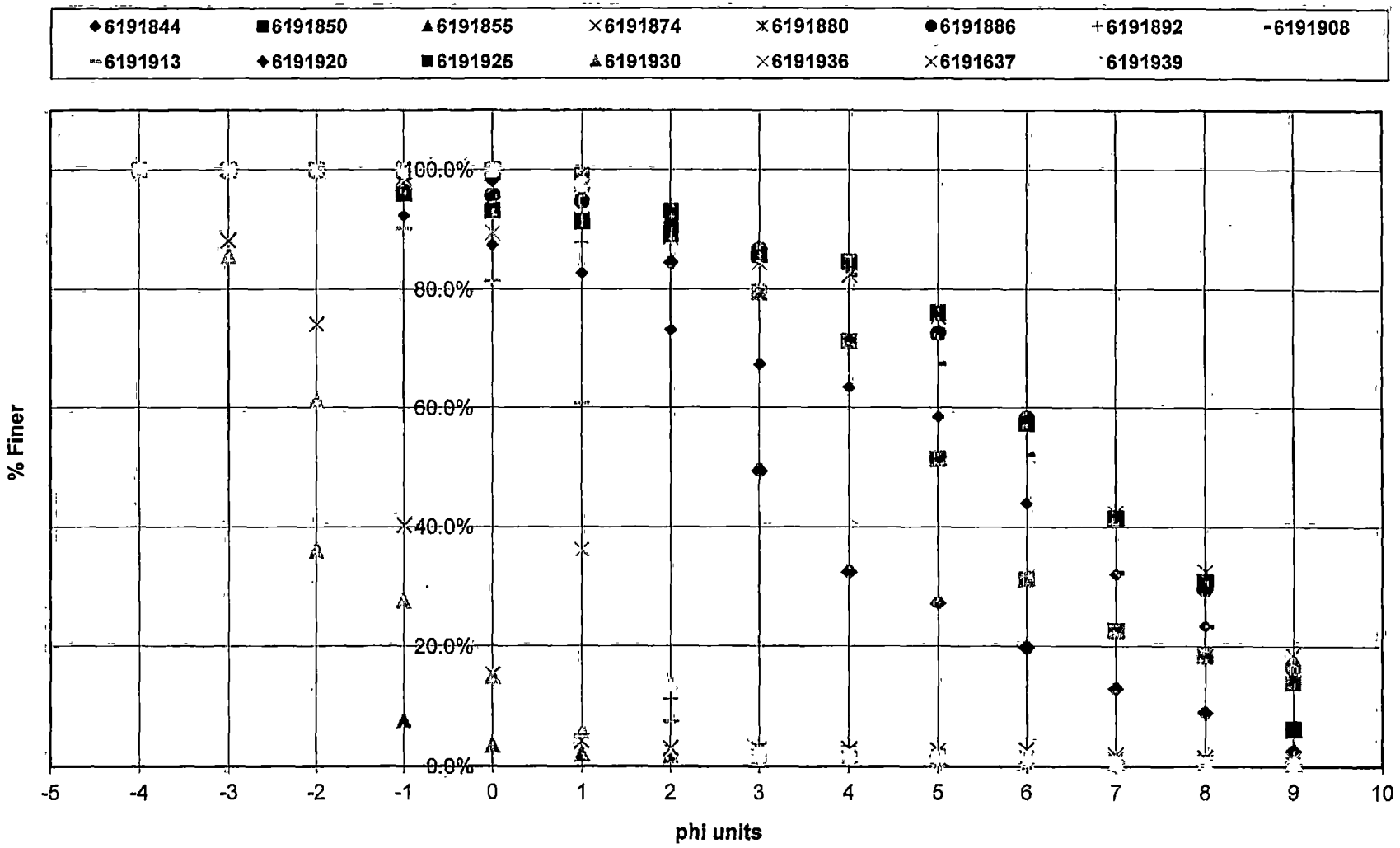
Turnaround Time (TAT) Business Days
Regular TAT:
☒ 5 - 7 days
Rush TAT:
☐ 1 day ☐ 2 days
☐ 3 - 4 days
Date Required:
Time Required:

SAMPLE IDENTIFICATION	DATE / TIME SAMPLED	SAMPLE MATRIX	# OF CONTAINERS	COMMENTS - Site/Sample Info, Sample Containment	Field Filtered/ Preserved	Hot Water Boron (Miss.)	Available Metals(w Sn,Se-LL)	Hexavalent Chromium	Mercury	PSA - Sieve & Pipette	TOC (Cal)	TIC	DDT	Silica Gel Cleanup	TPH/BTEX (PIRI) Tier 1	Total PAH	Total PCB's (Calculation)	PCB Arochlors-1242,1248,1254,1260 (Miss)	PCB Arochlors-1016,1221,1232,1262,1268 (Cal)						Lab Sample #
Car-2014-1-1	16-Dec-14	sed./soil	2 x 500 ml	marine sediment						X	X														
Car-2014-1-2	16-Dec-14	sed./soil	2 x 500 ml	marine sediment						X	X														
Car-2014-1-3	16-Dec-14	sed./soil	2 x 500 ml	marine sediment						X	X														

Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	Special Instructions
Connors Diving	17-Dec-14	Trina Dacket	10:40	Please provide the results in GIS-ready format.
Sample Relinquished By (print name & sign)	Date/Time	Samples Received By (print name and sign)	Date/Time	
		Diane Doiron	17-Dec-14	Page 3 of 3

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Particle Size Distribution 14x929293



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amec foster wheeler

APPENDIX D
Limitations

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LIMITATIONS

1. The work performed in the preparation of this report and the conclusions presented are subject to the following:

    1. The Standard Terms and Conditions which form a part of our Professional Services Contract.
    2. The Scope of Services.
    3. Time and Budgetary limitations as described in our Contract.
    4. The Limitations stated herein.

2. No other warranties or representations, either expressed or implied, are made as to the professional services provided under the terms of our Contract, or the conclusions presented.
3. The information presented in this report is based on sampling techniques which are considered industry-standard for this type of assessment (i.e., samples collected by divers using standard procedures commonly accepted by PWGSC).
4. The sediment characteristics at the Site were assessed, within the limitations set out above, having due regard for applicable environmental regulations as of the date of the analytical reporting.
5. No request for information about the site history or operating practices within the site boundaries has been included in the scope of work for this project.
6. Sample collection and testing was carried out in accordance with the terms of our contract. Other substances, or different quantities of substances testing for, may be present on Site and may be revealed by different or other testing not provided for in our contract.
7. This report is for the sole use of the party to whom it is addressed unless expressly stated otherwise in the report or contract. Any use which any third party makes of the report, in whole or the part, or any reliance thereon or decisions made based on any information or conclusions in the report is the sole responsibility of such third party. Amec Foster Wheeler accepts no responsibility whatsoever for damages or loss of any nature or kind suffered by any such third party as a result of actions taken or not taken or decisions made in reliance on the report or anything set out therein.

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Smith, Colleen A

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: October-25-18 3:45 PM
To: Fraser, Terri
Cc: MacPhail, Helen; Keats, Paul J; Smith, Colleen A
Subject: NPNS - CSR/Stantec Harbour Bottom Survey Plan
Attachments: 1806 N Pulp Caribou Route Scope for Hugh.docx; NPNS_harbour_bottom_survey_plan_20181015.pdf

One attachment provided elsewhere on file

Follow Up Flag: Follow up
Flag Status: Completed

Hi Terri,

Thank you for the description of the proposed survey plan (attached) for the new effluent pipeline route at Caribou Harbour. We don't have concerns, and you can proceed to do the work in order to collect baseline information.

Please however note DFO's recommendations below:
DFO recommends that all contractors and crew conducting the proposed activity follow the standard measures in relation to marine mammals that are described in the Canadian Coast Guard's Notices to Mariners. In particular, the NOTMAR 5 General Guidelines for Aquatic Species at Risk and Important Marine Mammal Areas includes general guidelines for operating in the vicinity of marine mammals.

Regards,

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: Fraser, Terri <terri.fraser@northernpulp.com>
Sent: Tuesday, October 16, 2018 1:51 PM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Wilson, Michael <michael.wilson@northernpulp.com>; Breen, Don < [redacted] Davis, Dave [redacted] MacDougall, Hugh < [redacted]
Subject: RE: NPNS - CSR/Stantec Harbour Bottom Survey Plan

Hi Helen,

Please also find attached the CSR scope of work.

Regards,

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Terri Fraser P. Eng
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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www.paperexcellence.com

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Since its inaugural year in 2010, Paper Excellence Canada (PEC) has evolved from a new entrant as an exporter to a leader in Canada's value-added natural resources (pulp) industry. Achieving sales in excess of $1 billion through its seven Canadian mills, PEC has accomplished this level of sales volume through innovation and best practices in all areas with a commitment to deliver premium quality products to all customers. Through its Richmond-based headquarters which hosts an employee base of 100 supporting over 2300 employees in Canada and Europe, PEC continues to lead by example operating through economic and environmentally sustainable best practices.

From: Fraser, Terri
Sent: Tuesday, October 16, 2018 1:38 PM
To: 'Helen.Yeh@novascotia.ca' <Helen.Yeh@novascotia.ca>
Cc: Wilson, Michael <michael.wilson@northernpulp.com>; [redacted] MacDougall, Hugh [redacted]
Subject: NPNS - CSR/Stantec Harbour Bottom Survey Plan

Hi Helen,

I have attached the revised Stantec survey plan for your review. It is an update of the original plan shared with you back in April 2018. We have CSR going back in the water next week to begin performing the additional survey work.

Best Regards,

Terri Fraser P. Eng
Technical Manager
Northern Pulp Nova Scotia
P: (902) 752-8461 [redacted]

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www.paperexcellence.com

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Effluent Treatment Plant Replacement Project Abercrombie Point, Nova Scotia – Proposed Methodology for Harbour Bottom Investigation: Caribou Harbour Pipeline Route

Stantec

Prepared for:
Northern Pulp Nova Scotia Corporation
P.O. Box 549, Station Main
New Glasgow, NS B2H 5E8

Prepared by:
Stantec Consulting Ltd.
102 – 40 Highfield Park Drive
Dartmouth, Nova Scotia
B3A 0A3

October 15, 2018

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1.2 THE SCOPE 1

2.0 FISH HABITAT CHARACTERIZATION 3

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4.0 CLOSURE 5

LIST OF FIGURES

Figure 1 Proposed Pipeline Route and Underwater Survey Area (Shown in Red) in Caribou Harbour, Nova Scotia for the Effluent Treatment Plant Replacement Project 2

LIST OF APPENDICES

Appendix A Underwater Camera Specifications

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EFFLUENT TREATMENT PLANT REPLACEMENT PROJECT ABERCROMBIE POINT, NOVA SCOTIA – PROPOSED METHODOLOGY FOR HARBOUR BOTTOM INVESTIGATION: CARIBOU HARBOUR PIPELINE ROUTE

October 15, 2018

1.0 INTRODUCTION

Paper Excellence Canada is planning to replace the existing effluent treatment system at the Northern Pulp mill on Abercrombie Point, NS. The system will be replaced with a new wastewater treatment plant, including a new marine effluent outfall. To carry out this project, a marine geotechnical and harbour bottom video investigation of the proposed route for the new submerged effluent outfall within Caribou Harbour and the Northumberland Strait is required.

1.1 THE PURPOSE

On behalf of Northern Pulp Nova Scotia Corporation (NPNS), Stantec Consulting Ltd. (Stantec) is hereby submitting a proposed marine benthic habitat video survey plan to the Department of Fisheries and Oceans (DFO) for review and comment and/or approval. An underwater benthic habitat survey (UBHS) report, including information on the existing Study Area will be prepared for submission to DFO. The purpose of the marine benthic habitat video survey is to characterize fish and fish habitat in the footprint of the outfall pipeline route within Caribou Harbour and the Northumberland Strait. As a result of the video survey, baseline information will be collected on the existing environment within the Project area, which will be used to aid in permitting with DFO and NSE.

In addition, the objective of the video survey and the proposed marine geophysical (side-scan sonar and magnetometer) surveys are to assist with analyzing for potential marine archaeological resources; therefore, this plan is provided as well to the Special Places Coordinator, who reviews archaeological permits and reports for the Province of Nova Scotia, to determine whether the proposed survey plan will suffice for the underwater archaeological reconnaissance.

1.2 THE SCOPE

Underwater video images collected in association with side-scan sonar data will be the most appropriate data to collect for characterizing the benthic habitat, including surficial substrate type and marine macrofauna and macroflora in the footprint of the proposed subsea effluent pipeline.

A visual survey of the entire proposed outfall routing will be conducted after the results from the side-scan sonar and magnetometer surveys are conducted and a final pipeline route has been selected. The side-scan sonar survey will be conducted in manner as such to cover the entire 200-m wide outfall route and at the diffuser location (refer to Figure 1). Representative reference areas will be visually inspected for each distinct habitat type identified within the proposed pipeline route. These areas will be located within the 200-m wide outfall route at a minimum distance of 50 m from the pipeline. The underwater video survey will be conducted by a Canadian Seabed Research (CSR) surveyor with a high definition drop camera, under the direction and supervision of a Stantec marine scientist and will be collected as per the DFO Underwater Video Site Survey Guidelines (1999). A Stantec marine scientist will analyze the video post-survey as part of the Underwater Benthic Habitat Survey (UBHS) report.

s.20(1)(b)
s.20(1)(c)
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EFFLUENT TREATMENT PLANT REPLACEMENT PROJECT ABERCROMBIE POINT, NOVA SCOTIA – PROPOSED METHODOLOGY FOR HARBOUR BOTTOM INVESTIGATION: CARIBOU HARBOUR PIPELINE ROUTE

October 15, 2018

A [redacted] Camera [redacted] (refer to Appendix A for technical details of the camera system) will be used to conduct the underwater video inspection of the proposed centreline pipeline route from a CSR research vessel (refer to Figure 1 for the proposed centreline route). The camera in the water, situated directly below the GPS antenna on the survey vessel, will be slowly towed and where the video will have overlay GPS coordinates so that the camera's position is available on the recorded video image at all times. The camera will fly at an altitude above the seafloor that will maximize the swath of the route observed while still maintaining visual clarity of the seafloor substrate, macroflora, and macrofauna. This altitude will be determined in the field based on water clarity. Habitat types will be identified on the basis of the results from the side-scan sonar survey and confirmed in the field by the marine scientist based on substrate, macroflora, and macrofauna visual observations in the video.

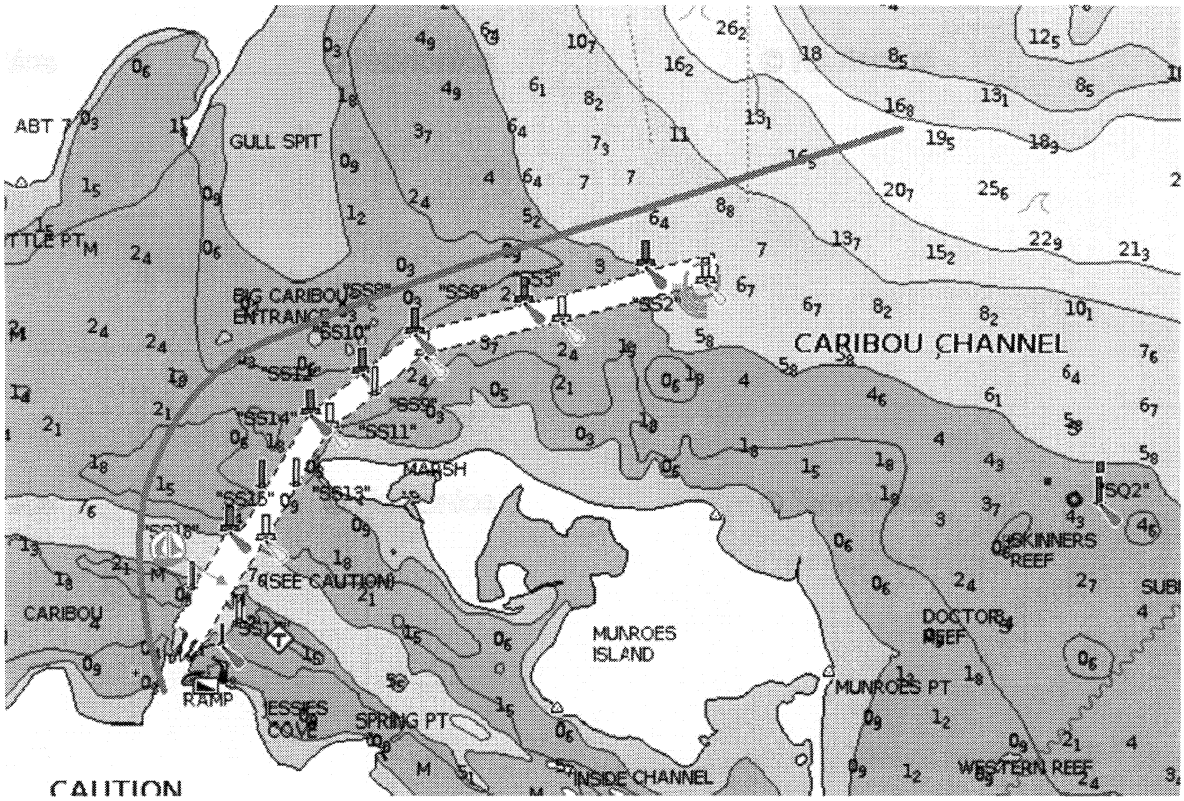


Figure 1 **Proposed Pipeline Route and Underwater Survey Area (Shown in Red) in Caribou Harbour, Nova Scotia for the Effluent Treatment Plant Replacement Project**

In the event that eelgrass (*Zostera marina*) beds are identified during the side-scan sonar survey, each bed will be verified for the presence of eelgrass by conducting underwater video ground truthing. Eelgrass beds will be delineated on side-scan sonar maps. This will allow for the location of the bed and its extent to be mapped out for future use.

s.20(1)(b)
s.20(1)(c)

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As a deliverable for the UBHS work, a final summary report and corresponding video footage will be provided to Northern Pulp and DFO. The report will include study objectives, a site diagram illustrating transect locations, a table providing transect coordinates in NAD 83 datum, field methods used, interpretation of the underwater video and any limitations that may be present.

The underwater video will also be reviewed by a Stantec marine archeologist and where noticeable side-scan sonar anthropogenic features and magnetometer targets identified during those surveys will also be surveyed with the video camera. The side-scan sonar survey will provide 100% coverage of the pipeline corridor using a [redacted] and the magnetometer survey will be conducted using a [redacted] Marine Magnetometer along the proposed centreline route for the pipe. A Stantec marine archaeologist will review the resulting data from the video survey including any additional remote sensing and geophysical surveys conducted along with the video. This will include the review of the data and the preparation of a memo detailing the results of the survey as it pertains to marine archaeology and will make recommendations for any additional archaeological reconnaissance or screening, if required.

2.0 FISH HABITAT CHARACTERIZATION

Side-scan sonar data will be used to assist mapping of distinct habitat types of the seafloor of the proposed outfall route and at the location of the diffuser. This mapping will initially be used by a Stantec marine scientist to determine key habitat types based on substrate classifications observed. A high-level video analysis will be conducted on the entire length of the proposed route to validate areas of key habitat types characterized by the side-scan sonar data, as well as to identify any anthropogenic features within the route. Once key habitat types have been identified through the aide of side-scan sonar and high-level video reviews, portions of each habitat type (up to 2 kilometres total) as well as at the diffuser location will be reviewed in higher detail. It is assumed that there will be three to four habitat types within the outfall route based on past experience and existing information. Approximately 500 m of each habitat type will therefore be reviewed in higher detail and for the location of the diffuser.

A detailed review of each habitat type characterized will be conducted in a manner as to identify macroflora and macrofauna species distributions to the lowest possible taxonomic level and will be presented as a percentage of substrate covered in 50-m increments of the seabed. This method has been typically used for underwater benthic habitat surveys of relatively long linear routes. Substrate type will be determined according to the following classifications:

- Bedrock
- Boulder (>25 cm)
- Cobble (3-13 cm)
- Gravel (2-3 cm)
- Sands
- Clay Silt
- Organic
- Shell Hash

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Macrofaunal species distributions will be classified based on the following categories:

- A = Abundant; numerous (not quantifiable) observations made in the field of view throughout the entire habitat segment.
- C = Common; numerous (not quantifiable) observations made in the field of view intermittently along the habitat segment.
- O = Occasional; quantifiable observations made in the field of view intermittently along the habitat segment.
- U = Uncommon; quantifiable observations made in the field of view infrequently along the habitat segment.

An underwater benthic habitat survey report will be created outlining the key habitat types including macroflora, macrofauna, and substrate identified along the proposed outfall route and at the diffuser location. A summary table as well as habitat mapping of the outfall route will be incorporated into the report. Habitat mapping will outline key habitat types characterized as well as key macroflora and macrofauna.

3.0 QUALITY ASSURANCE AND QUALITY CONTROL

Stantec's Quality Management System has ISO9001:2008 certification which requires peer-reviewed engineering design and scientific reporting deliverables to be followed across all operations.

QA/QC procedures are essential to produce data that meet an acceptable level of quality, is legally defensible, and that the level of quality is adequately documented. QA/QC procedures being with simple project design, and carry through the whole process including sample collection, sample shipment, sample storage, sample analysis, data management, data transfer, and reporting.

Stantec has established QA/QC procedures that are reflective of best practices and are consistent with those outlined in DFO's Underwater Video Site Survey Guidelines (1999).

To confirm that the work was carried out as planned the on-site Stantec field person will be specifically asked to confirm that the coordinates supplied were correct and used in the field. If refinement of coordinates is required on site because of obstacles on or in the water, the on-site Stantec person will record and provide the alternate coordinates used for the work.

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4.0 CLOSURE

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report and the referenced documents. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken.

This report represents the best professional judgment of Stantec personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

STANTEC CONSULTING LTD.

Prepared by:

Digitally signed by Sean Wilson
DN: cn=Sean Wilson, o=Stantec Consulting Ltd., ou=Stantec, email=Sean.Wilson@Stantec.com, c=CA
Date: 2018.10.15 16:49:12 -03'00'

Sean Wilson, B.Sc
Marine Scientist and Project Manager
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Reviewed by:

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Sam Salley, M.Sc.
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APPENDIX A
UNDERWATER CAMERA SPECIFICATIONS

Page 1172

is withheld pursuant to sections

est retenue en vertu des articles

20(1)(b), 20(1)(c)

of the Access to Information Act

de la Loi sur l'accès à l'information

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Consultation Meeting under the Mi'kmaq-Nova Scotia-Canada Consultation Terms of Reference
between
Pictou Landing First Nation and
the Province of Nova Scotia – Nova Scotia Environment
regarding
Proposed Northern Pulp Nova Scotia Effluent Treatment Plant

October 30, 2018
NSE Boardroom 18C, Barrington Tower
Scotia Square (Duke Street), Halifax, NS.

Pictou Landing First Nation (PLFN): Chief Andrea Paul, Brian Hebert, + members of PLFN Council
Nova Scotia Environment: Helen Yeh, Helen McPhail, Marc Theriault
Office of Aboriginal Affairs: Beth Lewis, Beata Dera
Department of Fisheries and Oceans: Mark MacLean
Transport Canada: Kevin LeBlanc, Céline Gaudet
Environment and Climate Change Canada: MT Grant, Michael Hingston
Northern Pulp: Terri Fraser, Kathy Cloutier, Bruce Chapman, plus others

Notes from DFO:

- Discussion at the beginning about confidentially and the issue with not being able to share information within the PLFN community.
- PLFN questioned if it was meaningful consultation if they couldn't share information within the community.
- Fishers in the community are very nervous.
- Last consultation meeting was June 2018 but federal departments were not present.
- A list of issues of concern were provided, these include:
    - ETF and pipeline construction impacts on fishing season.
    - ETF and pipeline construction impacts on Pictou Harbour and Northumberland Strait sea bottom.
    - Salinity levels of effluent at outfall site (Strait).
    - Temperature levels of effluent at outfall site (Strait).
    - Impacts of effluent on fish and habitat and, therefore, impacts on fishery.

- NP provided a presentation on the new routing option and treatment system.
- New pipe would be buried out to the diffuser (would follow the ferry route which was dredge in 2017 under a letter of advice from DFO)
- PLFN concerned about settling of material near the outfall – it was explained as this was regulated by ECCC it would not be an area DFO would be examining.
- The outfall is designed to minimize sediment settling and it is not expected to impact the benthic habitat in the area of the diffuser.
- Draft reports are done for the original site but not data collected for the new site as consultants were forced back to the dock by fishers.

- Regulators provided an overview of their roles.

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- PLFN asked how fish stocks are protected from the effluent by the federal government.
- It was explained that ECCC regulates the effluent and DFO looks at the physical footprint of the pipe.
- The difference between sections 35 and 36 of the Fisheries Act were outlined.
- There was a question regarding the regional boundaries of DFO which was explained.

- PLFN noted that there are herring spawning beds in the area of the new proposed outfall site and that herring catches are at an all-time low.
- Gyres on either end of the strait reduce mixing, therefore effluent is not flushed out of the strait as quickly as some would expect.
- Lobsters seed the larvae to the west so impacts could be seen outside the effluent outfall area.
- Impacts may not be seen for 5 to 7 years as it takes this long for larvae stages to reach commercial size.

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Wambolt, Michael

From: McLean, Mark G
Sent: November-05-18 8:27 AM
To: Yeh, Helen X; Hingston, Michael (EC)
Cc: Grant, MT (EC); Zwicker, Stephen (EC); Jalloh, Rugi; Wambolt, Michael; Smith, Colleen A; MacPhail, Helen
Subject: RE: Northern Pulp ETF EA - fish/habitat baseline

Hi Helen, I appreciate the provincial interest in determining the need for baseline information, however DFO is not able to provide any advice on a federally regulated activity unless requested by the federal regulator. In this case ECCC. Therefore we will not be participating in the call unless requested by ECCC.

Mark

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: Friday, November 2, 2018 3:33 PM
To: McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>; Hingston, Michael (EC) <michael.hingston@canada.ca>
Cc: Grant, MT (EC) <mt.grant@canada.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>; MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Subject: RE: Northern Pulp ETF EA - fish/habitat baseline

Hi everyone,

Are you available next Wednesday, Thursday or Friday (except 10:30-11:30) for a call to discuss the baseline issues raised by PLFN? It should take about an hour. If yes, please let me know what day/time works for you. Thanks.

Helen

From: McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>
Sent: Friday, November 02, 2018 2:21 PM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>; Hingston, Michael (EC) <michael.hingston@canada.ca>
Cc: Grant, MT (EC) <mt.grant@canada.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: RE: Northern Pulp ETF EA - fish/habitat baseline

Helen:

Effluent is not regulated by DFO, therefore DFO has no mandate to ask for or advise on baseline studies for an activity regulated by ECCC unless requested by ECCC.

Mark

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: Friday, November 2, 2018 1:55 PM
To: McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>; Hingston, Michael (EC) <michael.hingston@canada.ca>
Cc: Grant, MT (EC) <mt.grant@canada.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Jalloh, Rugi

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<Rugi.Jalloh@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: RE: Northern Pulp ETF EA - fish/habitat baseline

Thanks for this Mark. However, it would be useful to hear from you and others regarding what baseline would be considered adequate for the project operational phase (when the treated effluent will be discharged). Perhaps, we can have a call on this next week if folks are available. Helen.

From: McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>
Sent: Friday, November 02, 2018 11:27 AM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>; Hingston, Michael (EC) <michael.hingston@canada.ca>
Cc: Grant, MT (EC) <mt.grant@canada.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: RE: Northern Pulp ETF EA - fish/habitat baseline

Hi Helen,

Although not related to the effluent monitoring, NP is required to provide a detailed description of biological and physical characteristics of the proposed project site as part of our review. This will provide DFO with information on fish habitats that may be impacted as a result of the pipeline construction.

Mark

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: Friday, November 2, 2018 10:35 AM
To: Hingston, Michael (EC) <michael.hingston@canada.ca>; McLean, Mark G <Mark.McLean@dfo-mpo.gc.ca>
Cc: Grant, MT (EC) <mt.grant@canada.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Smith, Colleen A <Colleen.Smith@dfo-mpo.gc.ca>
Subject: Northern Pulp ETF EA - fish/habitat baseline

Hi Michael and Mark,

About the PLFN consultation meeting re Northern Pulp ETF this past Tuesday, PLFN has asked questions on what fish/habitat baseline will be required in the context of effluent discharge.

I don't have details on what NP plans to submit re baseline. However, since NP has been talking with individual department regarding the new pipeline route, perhaps some of you have details to share.

Perhaps, there is also a need for all of us to meet with NP specifically on this. Thoughts?

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925

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e-mail: Helen.Yeh@novascotia.ca

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Wambolt, Michael

From: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Sent: November-13-18 2:04 PM
To: Keats, Paul J; Vervaet, Sharon; Furey, Stefan M; Check, Gordon G; Sinclair, Andrew; Passerini, Linda; Petrie, Bob D; Milton, Randy Gordon; McNeill, Alan J; LeBlanc, Jason E; Weseloh McKeane, Sean; Jalloh, Rugi; Smith, Colleen A; Wambolt, Michael; 'Allison Denning (allison.denning@hc-sc.gc.ca)'; 'Flanagan, Jason'; Webb, Troy; Chisholm, Greg L
Cc: Johnson, Kathleen; Theriault, Marc P; McDonald, Jennifer D; MacPhail, Helen
Subject: RE: Northern Pulp EA Registration Update
Attachments: NP presentation deck_to NSE_2018Oct18.pdf →

Attachment provided elsewhere on the file.

Hi again, please dis-regard the attachment I just sent. Attached is the right document. Helen.

From: Yeh, Helen X
Sent: Tuesday, November 13, 2018 2:00 PM
To: Keats, Paul J <Paul.Keats@novascotia.ca>; Vervaet, Sharon <Sharon.Vervaet@novascotia.ca>; Furey, Stefan M <Stefan.Furey@novascotia.ca>; Check, Gordon G <Gordon.Check@novascotia.ca>; Sinclair, Andrew <Andrew.Sinclair@novascotia.ca>; Passerini, Linda <Linda.Passerini@novascotia.ca>; Petrie, Bob D <Bob.Petrie@novascotia.ca>; Milton, Randy Gordon <Gordon.Milton@novascotia.ca>; McNeill, Alan J <Alan.McNeill@novascotia.ca>; LeBlanc, Jason E <Jason.LeBlanc@novascotia.ca>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca>; 'Jalloh, Rugi' <Rugi.Jalloh@dfo-mpo.gc.ca>; 'Smith, Colleen A' <Colleen.Smith@dfo-mpo.gc.ca>; 'Wambolt, Michael' <Michael.Wambolt@dfo-mpo.gc.ca>; 'Allison Denning (allison.denning@hc-sc.gc.ca)' <allison.denning@hc-sc.gc.ca>; 'Flanagan, Jason' <jason.flanagan@tc.gc.ca>; Webb, Troy <Troy.Webb@novascotia.ca>; Chisholm, Greg L <Greg.Chisholm@novascotia.ca>
Cc: Johnson, Kathleen <Kathleen.Johnson@novascotia.ca>; Theriault, Marc P <Marc.Theriault@novascotia.ca>; McDonald, Jennifer D <Jennifer.McDonald@novascotia.ca>; MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Subject: RE: Northern Pulp EA Registration Update

Hi everyone,

Attached has information about the new effluent pipeline option indicated below, in case you haven't seen it before. **Please do not share the deck outside of your respective department.** An updated deck from Dillion will also be provided before the meeting.

Also, the meeting will very likely be 10-12 on Nov. 22 (Thursday) in Halifax. I will be sending out a meeting invitation hopefully later today (including teleconference for those who cannot attend in person) once I hear from a few more people.

Helen

From: Yeh, Helen X
Sent: Thursday, November 08, 2018 3:52 PM
To: Keats, Paul J <Paul.Keats@novascotia.ca>; Vervaet, Sharon <Sharon.Vervaet@novascotia.ca>; Furey, Stefan M <Stefan.Furey@novascotia.ca>; Higgins, Jeremy W <Jeremy.Higgins@novascotia.ca>; Check, Gordon G <Gordon.Check@novascotia.ca>; Passerini, Linda <Linda.Passerini@novascotia.ca>; Petrie, Bob D <Bob.Petrie@novascotia.ca>; Milton, Randy Gordon <Gordon.Milton@novascotia.ca>; McNeill, Alan J <Alan.McNeill@novascotia.ca>; LeBlanc, Jason E <Jason.LeBlanc@novascotia.ca>; Weseloh McKeane, Sean <Sean.WeselohMcKeane@novascotia.ca>; Jalloh, Rugi <Rugi.Jalloh@dfo-mpo.gc.ca>; Smith, Colleen A

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<Colleen.Smith@dfo-mpo.gc.ca>; Wambolt, Michael <Michael.Wambolt@dfo-mpo.gc.ca>; Zwicker, Stephen (EC) <stephen.zwicker@canada.ca>; Hingston, Michael (EC) <michael.hingston@canada.ca>; Grant, MT (EC) <mt.grant@canada.ca>; 'Allison Denning (allison.denning@hc-sc.gc.ca)' <allison.denning@hc-sc.gc.ca>; Flanagan, Jason <jason.flanagan@tc.gc.ca>
Cc: Johnson, Kathleen <Kathleen.Johnson@novascotia.ca>; Theriault, Marc P <Marc.Theriault@novascotia.ca>; McDonald, Jennifer D <Jennifer.McDonald@novascotia.ca>; MacPhail, Helen <Helen.MacPhail@novascotia.ca>
Subject: FW: Northern Pulp EA Registration Update

Hi everyone,

About the Northern Pulp's effluent treatment facility project, NP's consultant, Dillon is requesting a meeting to update the EA and to discuss any information requirements/studies for the upcoming EA.

Note that NP is planning another effluent pipeline option, which I hope to share with you more details soon before the meeting. The new outfall location option will be near the NS/Pictou ferry route to PEI. Due to the new pipeline option, Dillon would like to know if there are any specific information needs.

Please let me know by next Tuesday (Nov. 13) which date(s) work for you/your department:
-Nov. 21 (Wednesday): 10 - 12
-Nov. 22 (Thursday): 10 - 12

The meeting will likely be at NSE in Halifax. A teleconference or Skype will likely be available as well. Please let me know in advance if you plan to attend via phone/Skype.

Thanks,

Helen

Helen Yeh
Environmental Assessment Officer
Nova Scotia Environment
1903 Barrington Street, Suite 2085, Halifax
Nova Scotia, B3J 2P8
Phone: (902) 717-1073
Fax: (902) 424-6925
e-mail: Helen.Yeh@novascotia.ca

From: Burgess, Annamarie <aburgess@dillon.ca>
Sent: Thursday, November 08, 2018 2:46 PM
To: Yeh, Helen X <Helen.Yeh@novascotia.ca>
Cc: Sarah Devereaux <SDevereaux@dillon.ca>; March, Karen [redacted]
Subject: Northern Pulp EA Registration Update

Good afternoon Helen,

Dillon would like to arrange a meeting with NSE regarding the Northern Pulp EA Registration in the next few weeks.

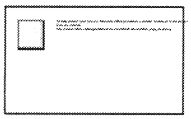
I am aware you had an update meeting in late October with NPNS regarding the new outfall location and route. NPNS has relayed to us their 'take-aways' from your meeting.

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However, our EA team would appreciate the opportunity to discuss with NSE and the other departments/regulators any items of focus that may be specific to the change in study area. We will also be able to provide some further detail on the project description, and the EA Registration document.

Would a meeting the week of November 19th be possible?
Our schedules are open the mornings of Nov 19 - 22nd.

Thank you,
Annamarie



Annamarie Burgess
Associate
Dillon Consulting Limited
137 Chain Lake Drive Suite 100
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